

# **INSTALLATION RESTORATION PROGRAM TWIN CITIES ARMY AMMUNITION PLANT**

## **FIVE-YEAR REVIEW REPORT OF THE FINAL REMEDY FOR THE NEW BRIGHTON/ARDEN HILLS SUPERFUND SITE**

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**SEPTEMBER 2004  
FINAL REPORT**

**TECUMSEH/WENCK  
INSTALLATION SUPPORT SERVICES**

# Table of Contents

## TCAAP

### Five-Year Review Report

#### List Of Acronyms

#### Executive Summary

#### Five-Year Review Summary Form

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1-1</b>
<b>2.0</b>	<b>SITE CHRONOLOGY.....</b>	<b>2-1</b>
<b>3.0</b>	<b>BACKGROUND .....</b>	<b>3-1</b>
3.1	Physical Characteristics .....	3-1
3.2	Land and Resource Use .....	3-2
3.3	History of Contamination .....	3-3
3.4	Initial Response.....	3-3
3.5	Basis For Taking Action.....	3-7
<b>4.0</b>	<b>OPERABLE UNIT 1 (OU1).....</b>	<b>4-1</b>
4.1	Remedial Actions.....	4-1
4.1.1	Remedy Selection .....	4-1
4.1.2	Remedy Implementation.....	4-2
4.1.3	System Operations/Operation and Maintenance (O&M) .....	4-5
4.2	Progress Since the Last Five-Year Review.....	4-5
4.3	Five-Year Review Process.....	4-6
4.3.1	Administrative Components .....	4-6
4.3.2	Community Notification and Involvement .....	4-6
4.3.3	Document Review.....	4-7
4.3.4	Data Review.....	4-7
4.3.5	Site Inspection.....	4-11
4.3.6	Interviews.....	4-11
4.4	Technical Assessment.....	4-12
4.4.1	<i>Question A: Is the Remedy functioning as intended by the decision documents?</i> .....	4-12

## Table of Contents (Cont.)

4.4.2	<i>Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?</i> .....	4-12
4.4.3	<i>Question C: Has any other information come to light that could call into question the protectiveness of the remedy?</i> .....	4-14
4.4.4	Technical Assessment Summary .....	4-14
4.5	Issues.....	4-14
4.6	Recommendations and Follow-up Actions.....	4-16
4.7	Protectiveness Statement .....	4-16
<b>5.0</b>	<b>OPERABLE UNIT 2 (OU2)</b> .....	<b>5-1</b>
5.1	Remedial Actions.....	5-1
5.1.1	Remedy Selection .....	5-1
5.1.2	Remedy Implementation.....	5-6
5.1.3	System Operations/Operation and Maintenance (O&M) .....	5-11
5.2	Progress Since the Last Five-Year Review.....	5-11
5.3	Five-Year Review Process.....	5-12
5.3.1	Administrative Components .....	5-12
5.3.2	Community Notification and Involvement .....	5-12
5.3.3	Document Review.....	5-12
5.3.4	Data Review.....	5-12
5.3.5	Site Inspection.....	5-23
5.3.6	Interviews.....	5-25
5.4	Technical Assessment.....	5-25
5.4.1	<i>Question A: Is the Remedy functioning as intended by the decision documents?</i> .....	5-25
5.4.2	<i>Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?</i> .....	5-31
5.4.3	<i>Question C: Has any other information come to light that could call into question the protectiveness of the remedy?</i> .....	5-38
5.4.4	Technical Assessment Summary .....	5-39
5.5	Issues.....	5-39
5.6	Recommendations and Follow-up Actions.....	5-41
5.7	Protectiveness Statement .....	5-43

## Table of Contents (Cont.)

<b>6.0</b>	<b>OPERABLE UNIT 3 (OU3)</b>	<b>6-1</b>
6.1	Remedial Actions	6-1
6.1.1	Remedy Selection	6-1
6.1.2	Remedy Implementation	6-2
6.1.3	System Operations/Operation and Maintenance (O&M)	6-3
6.2	Progress Since the Last Five-Year Review	6-3
6.3	Five-Year Review Process	6-3
6.3.1	Administrative Components	6-3
6.3.2	Community Notification and Involvement	6-4
6.3.3	Document Review	6-4
6.3.4	Data Review	6-4
6.3.5	Site Inspection	6-5
6.3.6	Interviews	6-6
6.4	Technical Assessment	6-6
6.4.1	<i>Question A:</i> Is the Remedy functioning as intended by the decision documents?	6-6
6.4.2	<i>Question B:</i> Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?	6-6
6.4.3	<i>Question C:</i> Has any other information come to light that could call into question the protectiveness of the remedy?	6-8
6.4.4	Technical Assessment Summary	6-8
6.5	Issues	6-8
6.6	Recommendations and Follow-up Actions	6-9
6.7	Statement of Protectiveness	6-10
<b>7.0</b>	<b>OTHER REMOVAL ACTIONS</b>	<b>7-1</b>
7.1	Removal Actions	7-1
7.1.1	Remedy Selection	7-1
7.1.2	Remedy Implementation	7-2
7.1.3	System Operations/Operation and Maintenance (O&M)	7-2
7.2	Progress Since the Last Five-Year Review	7-3
7.3	Five-Year Review Process	7-3
7.3.1	Administrative Components	7-3
7.3.2	Community Notification and Involvement	7-3
7.3.3	Document Review	7-3
7.3.4	Data Review	7-4
7.3.5	Site Inspection	7-4
7.3.6	Interviews	7-5



## Table of Contents (Cont.)

7.4	Technical Assessment.....	7-5
7.4.1	<i>Question A:</i> Is the Remedy functioning as intended by the decision documents? .....	7-5
7.4.2	<i>Question B:</i> Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?.....	7-6
7.4.3	<i>Question C:</i> Has any other information come to light that could call into question the protectiveness of the remedy? .....	7-8
7.4.4	Technical Assessment Summary .....	7-8
7.5	Issues.....	7-8
7.6	Recommendations and Follow-up Actions.....	7-9
7.7	Protectiveness Statement .....	7-9
8.0	<b>NEXT REVIEW.....</b>	<b>8-1</b>
9.0	<b>APPROVALS.....</b>	<b>9-1</b>

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## **Table of Contents (Cont.)**

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### **TABLES**

- 3-1 Chemicals of Concern (COCs) and Selected Cleanup Levels
  
- 4-1 Status of Remedial Actions: FY 2003
- 4-2 OU1 Pumping/VOC Mass Removal Data: FY 2003
- 4-3 OU1, PGAC Effluent Water Quality: FY 2003
  
- 5-1 Groundwater Quality Data for OU2 Shallow Soil Site 5-Year Groundwater Monitoring
- 5-2 Deep Groundwater Data Near Sites D and G: FY 2003
- 5-3 Site A Pumping Data: FY 2003
- 5-4 Site A Monthly VOC Removal: FY 2003
- 5-5 Site A Effluent Water Quality: FY 2003
- 5-6 Groundwater Quality Data, FY 2003, Site I
- 5-7 Summary of Monthly VOC Removal, FY 2003, Site K
- 5-8 Treatment System Concentrations (Organics), FY 2003, Site K
- 5-9 Extraction Well Water Pumped, FY 2003, TGRS
- 5-10 VOC Mass Loading Summary, FY 2003, TGRS
  
- 6-1 Summary of Monthly VOC Removal, FY 2003, PGRS
  
- 7-1 Grenade Range Water Quality Data: FY 2003

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## Table of Contents (Cont.)

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### **FIGURES**

- 3-1 Site Location Map
- 3-2 Original TCAAP Boundary
- 3-3 Conceptual Illustration of TCAAP Site Geology
- 3-4 Cross-Section A-A' (North Half), Summer 2003
- 3-5 Cross-Section A-A' (South Half), Summer 2003
- 3-6 Conceptual Illustration of TCAAP Operable Units
- 3-7 TCAAP Site Boundaries
  
- 4-1 Special Well Construction Area
- 4-2 OU1 & OU3, Upper Unit 4, Potentiometric Map, Summer 2003
- 4-3 OU1 & OU3, Upper Unit 3, Trichloroethene Isoconcentration Map, Summer 2003
- 4-4 OU1 & OU3, Lower Unit 3, Trichloroethene Isoconcentration Map, Summer 2003
- 4-5 OU1 & OU3, Upper Unit 4, Trichloroethene Isoconcentration Map, Summer 2003
- 4-6 New Brighton Municipal Wells: Trichloroethene Water Quality Trends
  
- 5-1 General Locations of Soil Covers
- 5-2 Site D, Well 03U093, Trichloroethene Water Quality Trend
- 5-3 Site A, Unit 1, Potentiometric Map, Summer 2003
- 5-4 Site A, Unit 1, cis-1,2-Dichloroethene Isoconcentration Map, Summer 2003
- 5-5 Site I, Unit 1 Groundwater Elevations, 6/2/03
- 5-6 Site K, Unit 1 Potentiometric Map, 6/4/03
- 5-7 Site K, Unit 1, Trichloroethene Concentration Map, 6/4/03
- 5-8 TGRS Layout
- 5-9 OU2, Upper Unit 3, Potentiometric Map, 6/9/03
- 5-10 OU2, Lower Unit 3, Potentiometric Map, 6/9/03
- 5-11 OU2, Upper Unit 4, Potentiometric Map, 6/9/03
- 5-12 OU2, Upper Unit 3, Trichloroethene Isoconcentration Map, Summer 2003
- 5-13 OU2, Lower Unit 3, Trichloroethene Isoconcentration Map, Summer 2003
- 5-14 OU2, Upper Unit 4, Trichloroethene Isoconcentration Map, Summer 2003
- 5-15 TGRS Treatment System Performance
- 5-16 Well Locations for Shallow Soil Site Monitoring
  
- 6-1 OU3 (PGRS) TRCLE vs. Time
  
- 7-1 Grenade Range Monitoring Well Locations

# Table of Contents (Cont.)

## **APPENDICES**

### A Site Inspection Checklists

- A.1 List of Attendees for Site Inspection
- A.2 Operable Unit 1
- A.3 Operable Unit 2, Shallow Soil Sites
- A.4 Operable Unit 2, Deep Soil Sites (D and G)
- A.5 Operable Unit 2, Site A Shallow Groundwater
- A.6 Operable Unit 2, Site I Shallow Groundwater
- A.7 Operable Unit 2, Site K Shallow Groundwater
- A.8 Operable Unit 2, Deep Groundwater
- A.9 Operable Unit 3
- A.10 Grenade Range and Outdoor Firing Range

### B Community Notices and Responsiveness Summary

- B.1 Newspaper Notices
- B.2 Responses to Public Comments

### C Photographs from Site Inspection

### D Annual Site Inspection Checklist for Land Use Controls

## List of Acronyms

Alliant	- Alliant Techsystems Inc.
ACM	- Asbestos-Containing Material
APR	- Annual Performance Report
ARAR	- Applicable or Relevant and Appropriate Requirements
Army	- U.S. Army
AS/SVE	- Air Sparging/Soil Vapor Extraction
BGRS	- Boundary Groundwater Recovery System
CAMU	- Corrective Action Management Unit
CERCLA	- Comprehensive Environmental Response, Compensation, and Liability Act
CRA	- Conestoga-Rovers and Associates, Inc.
DNAPL	- Dense Non-Aqueous Phase Liquids
EDTA	- Ethylenediaminetetraacetic Acid
EE/CA	- Engineering Evaluation/Cost Analysis
ESD	- Explanation of Significant Difference
FFA	- Federal Facilities Agreement
FY	- Fiscal Year
GAC	- Granular Activated Carbon
gpm	- Gallons per Minute
HEAST	- Health Effects Assessment Summary Tables
HRC	- Hydrogen Release Compound
HRL	- Health Risk Limit
IRA	- Interim Remedial Action
IRIS	- Integrated Risk Management System
LUC	- Land Use Control
LUCIP	- Land Use Control Implementation Plan
MCES	- Metropolitan Council Environmental Services

## **List of Acronyms (Cont.)**

MCL	- Maximum Contaminant Level
MCLG	- Maximum Contaminant Level Goal
MDH	- Minnesota Department of Health
MERLA	- Minnesota Environmental Response and Liability Act
mg/kg	- Milligrams per Kilogram
MPCA	- Minnesota Pollution Control Agency
NB/AH	- New Brighton/Arden Hills
NBCGRS	- New Brighton Contaminated Groundwater Recovery System
NBM	- New Brighton Municipal
NPL	- National Priorities List
O&M	- Operation and Maintenance
OU	- Operable Unit
PAHs	- Polynuclear Aromatic Hydrocarbons
PCBs	- Polychlorinated Biphenyls
PGAC	- Permanent Granular Activated Carbon
PGRS	- Plume Groundwater Recovery System
POTW	- Publicly-Owned Treatment Works
PRG	- Preliminary Remediation Goal
QAPP	- Quality Assurance Project Plan
RAO	- Remedial Action Objective
RAB	- Restoration Advisory Board
RAIs	- Recommended Allowable Limits
RCRA	- Resource Conservation and Recovery Act
RD/RA	- Remedial Design/Remedial Action
ROD	- Record of Decision
RRG	- Recommended Remediation Goal
SDWA	- Safe Drinking Water Act

## List of Acronyms (Cont.)

SECOR	- SECOR International, Inc.
SHAW	- Shaw Environmental & Infrastructure, Inc. (formerly Stone & Webster)
SVE	- Soil Vapor Extraction
SWCA	- Special Well Construction Area
TBC	- To Be Considered
TCAAP	- Twin Cities Army Ammunition Plant
Tecumseh	- Tecumseh Professional Services, Inc.
TGRS	- TCAAP Groundwater Recovery System
TSCA	- Toxic Substances Control Act
TWISS	- Tecumseh/Wenck Installation Support Services
$\mu\text{g/l}$	- Micrograms per Liter
USACHPPM	- U.S. Army Center for Health Promotion and Preventative Medicine
USAEC	- U.S. Army Environmental Center
USEPA	- U.S. Environmental Protection Agency
VOC	- Volatile Organic Compound
Wenck	- Wenck Associates, Inc.

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## **Executive Summary**

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This five-year review was performed by the U.S. Army for the New Brighton/Arden Hills Superfund Site, which is related to the Twin Cities Army Ammunition Plant (TCAAP). The first five-year review of the Site was signed on September 30, 1999, and the passage of another five years has triggered this review. The time period for events documented in this report is October 1, 1999 to September 30, 2003. The scope of this review included Operable Units 1, 2, and 3 and two removal actions (the Grenade Range and the Outdoor Firing Range). The conclusion supported by this review is that the remedies are functioning as intended, and that the components of the remedies remain protective of human health and the environment.

The next five-year review will be due five years from the date of signature of this report.



## Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): New Brighton/Arden Hills/TCAAP Site		
EPA ID (from WasteLAN): MN7213820908		
Region: 5	State: MN	City/County: Ramsey
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input checked="" type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Construction completion date: Estimated 2008	
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (site remains under federal control)		
REVIEW STATUS		
Lead agency: <input type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input checked="" type="checkbox"/> Other Federal Agency U.S. Army (TCAAP)		
Author name: Michael R. Fix		
Author title: Commander's Representative	Author affiliation: U.S. Army (TCAAP)	
Review period: October 2003 to September 2004		
Date(s) of site inspection: 3/2/2004		
Type of review:		
<input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action:		
<input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# _____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify) _____		
Triggering action date (from WasteLAN): 9/30/1999		
Due date (five years after triggering action date): 9/30/2004		

\* ["OU" refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

## Five-Year Review Summary Form (cont'd)

### Issues:

*The 1999 five-year review did not identify any deficiencies that required follow-up; however, it did make the following recommendations for adjustments to remediation systems in light of cleanup progress:*

- Operable Unit 1: Conduct additional evaluation of containment and optimum pumping rates for the containment wells since they were just reaching their design capacities at the time of the review.*
- Operable Unit 2: 1) Consider termination of the SVE systems at Sites D and G, 2) consider shutting off some of the clean extraction wells at Site A, and 3) consider shutting off some clean extraction wells for the deep groundwater and implement the recommendations of the optimization study when finalized.*
- Operable Unit 3: Re-evaluate the need for the level of hydraulic containment in light of the plume stability and declining contaminant concentrations.*

*There was follow-up on all of these recommendations; however, some still have outstanding issues as discussed in the current issues below. Detailed discussion of these items is included in Sections 4.0 through 6.0 of this five-year review report.*

### OUI

*The remedy requirement for containment is being evaluated and is anticipated to be changed (via a ROD amendment) to a requirement for verifying progress and cleanup of the plume through measurement of overall plume shrinkage (geographically) and decreasing contaminant concentrations.*

*On November 29, 2002, USEPA published draft guidance for evaluating the vapor intrusion to indoor air pathway from contaminated soil and groundwater. With respect to OUI, there is contaminated groundwater below residential homes. Given the depth to the contaminated groundwater, and the presence of a clay till layer in between the contamination and the ground surface, the vapor pathway is not expected to represent a concern. Nonetheless, it would be appropriate to consider the draft guidance for OUI.*

*The Minnesota Department of Health (MDH) has issued an interim exposure limit for trichloroethene that is equal to the OUI cleanup level of 5 ug/l (prompted by the USEPA release of a draft health risk assessment for trichloroethene). If the MDH Health Risk Limit (HRL) is ultimately revised and is lower than 5 ug/l, or if the federal Maximum Contaminant Limit (MCL) is lowered, the potential effects on the OUI cleanup level would need to be considered. The MDH is in the process of reviewing and revising the HRLs for a number of chemicals, not just trichloroethene. Revised HRLs need to be promulgated through rulemaking, and it is anticipated that this process will be culminated in 1-2 years. Revisions to the HRLs may have an impact on the groundwater cleanup levels for other chemicals observed in OUI.*

### OU2

*The federal government is planning to transfer approximately 774-acres of TCAAP. Statements are made that the remedies are functioning and remain protective under the current land use. While true, future use of the property could be a significant issue, and appropriate steps need to be taken to ensure that protectiveness is maintained. Because OU2 soil has been remediated to site-specific cleanup levels based on industrial use, if the future land use should change, the cleanup levels and associated risks should be reevaluated.*

## Five-Year Review Summary Form (cont'd)

*With or without transfer of property, it is important that the Army, MPCA, and USEPA agree on the types of LUCs, timing for implementation, and regulatory agency enforceability. There was a federal-level debate of these issues between the Department of Defense and USEPA, but as of October 2003, there was agreement on LUC Principles set forth by the Navy. The Army has endorsed the Navy/USEPA Principles and intends to implement LUC measures in a manner consistent with these Principles. This milestone will enable the TCAAP parties to move forward with resolution of site-specific LUCs, and make refinements, if necessary, to the LUCs that the Army has already implemented. Various amendments to the OU2 ROD have been mentioned in this report, and it is important that these amendments document the LUCs as a component of the remedies. Resolution of LUC issues will also allow final regulatory approval for the shallow soil closeout reports.*

*On November 29, 2002, EPA published draft guidance for evaluating the vapor intrusion to indoor air pathway from contaminated groundwater and soils. Given TCAAP's current status as an occupational setting, this guidance does not apply. However, should the land use change in the future, it would be appropriate to evaluate if the vapor intrusion exposure pathway is complete, and if so, whether it poses an unacceptable risk to human health.*

*The Minnesota Department of Health (MDH) has issued an interim exposure limit for trichloroethene, as discussed above for OU1. Although the new limit of 5 ug/l is lower than the OU2 cleanup level of 30 ug/l for the shallow groundwater sites, there is no immediate need to consider the lower number, since the shallow groundwater trichloroethene plumes are all contained on TCAAP. The new exposure limit of 5 ug/l is equal to the OU2 deep groundwater cleanup level. If the HRL is ultimately revised and is lower than 30 ug/l, the potential effects on the OU2 cleanup levels would need to be considered. The MDH is in the process of reviewing and revising the HRLs for a number of chemicals, not just trichloroethene. Revised HRLs need to be promulgated through rulemaking, and it is anticipated that this process will be culminated in 1-2 years. Revisions to the HRLs may have an impact on the groundwater cleanup levels for other chemicals observed in OU2.*

*High groundwater levels encountered at Site C have delayed completion of shallow soil remediation at this site. Options for completing remediation at Site C were under discussion at the end of FY 2003.*

*ROD amendments need to be executed for Sites C, D, G, I, and 129-15.*

*For deep groundwater, the flow rate of a new extraction well (B13) was lower than was initially predicted and needs to be addressed.*

### OU3

*Once the standby period has expired for the Plume Groundwater Recovery System (PGRS), including New Brighton Municipal (NBM) #13, it is anticipated that a ROD amendment will be executed to document that this remedy component is no longer required. The final decision will be based on sampling results from NBM #13 and nearby monitoring wells. Disposition of the PGRS and NBM #13 will need to be resolved between Alliant Techsystems and the City of New Brighton.*

*On November 29, 2002, USEPA published draft guidance for evaluating the vapor intrusion to indoor air pathway from contaminated soil and groundwater. With respect to OU3, there is contaminated groundwater below residential homes. Given the depth to the contaminated groundwater, and the presence of a clay till layer in between the contamination and the ground surface, the vapor pathway is not expected to represent a concern. Nonetheless, it would be appropriate to consider the draft guidance for OU3.*

## Five-Year Review Summary Form (cont'd)

*The Minnesota Department of Health (MDH) has issued an interim exposure limit for trichloroethene, as discussed above for OU1. If the HRL is ultimately revised and is lower than 5 ug/l, or if the federal MCL is lowered, the potential effects on the OU3 cleanup level would need to be considered. The MDH is in the process of reviewing and revising the HRLs for a number of chemicals, not just trichloroethene. Revised HRLs need to be promulgated through rulemaking, and it is anticipated that this process will be culminated in 1-2 years. Revisions to the HRLs may have an impact on the groundwater cleanup levels for other chemicals observed in OU3.*

### Grenade Range and Outdoor Firing Range

*Following review of the FY 2004 groundwater monitoring data from the Grenade Range, the Army, USEPA, and MPCA will need to decide whether to continue or discontinue monitoring (there are no monitoring requirements for the Outdoor Firing Range).*

*Issues regarding LUC enforcement authority has resulted in delay of final regulatory approval (consistency) on closeout reports for these two sites.*

### **Recommendations and Follow-up Actions:**

#### OU1

*The Army, USEPA, MPCA, Restoration Advisory Board, and City of New Brighton should resolve technical issues and proceed with the process of a ROD amendment.*

*Using USEPA guidance, the Army should evaluate the vapor intrusion to indoor air pathway to verify that there are no concerns for OU1.*

*The USEPA, MPCA, MDH, and Army should continue to monitor the USEPA's progress towards finalizing a health risk assessment for trichloroethene, and any subsequent effect upon the selected cleanup level for OU1. In addition, the MDH HRL revision process should be tracked to see if there would be any impact on cleanup levels for other chemicals.*

#### OU2

*For Shallow Soils, select a revised remedy for Site C shallow soils and implement it. Also, prepare ROD amendments for remedy selections at Sites C and 129-15.*

*For Deep Soil Sites (D and G), prepare ROD amendments for remedy selections at Site D (non-VOC shallow soils) and Site G.*

*For Site A Shallow Groundwater, monitor the trichloroethene HRL for any changes due to the USEPA's potential update of the trichloroethene health risk assessment. In addition, the MDH HRL revision process should be tracked to see if there would be any impact on cleanup levels for other chemicals.*

*For Site I Shallow Groundwater, prepare a ROD amendment for the change from pump and treat to a monitoring-based remedy. Also, monitor the trichloroethene HRL for any changes due to the USEPA's potential update of the trichloroethene health risk assessment. In addition, the MDH HRL revision process should be tracked to see if there would be any impact on cleanup levels for other chemicals.*

## Five-Year Review Summary Form (cont'd)

*For Site K Shallow Groundwater, monitor the trichloroethene HRL for any changes due to the USEPA's potential update of the trichloroethene health risk assessment. In addition, the MDH HRL revision process should be tracked to see if there would be any impact on cleanup levels for other chemicals.*

*For Deep Groundwater, determine what change(s) to the TGRS Operating Strategy are needed due to the lower than anticipated flow rate from extraction well B13. Also, monitor the trichloroethene HRL for any changes due to the USEPA's potential update of the trichloroethene health risk assessment. In addition, the MDH HRL revision process should be tracked to see if there would be any impact on cleanup levels for other chemicals.*

*For all OU2 sites, the Army, USEPA, and MPCA need to work towards resolution of LUC issues. Because OU2 soil has been remediated to cleanup levels based on site-specific exposure assumptions (commonly considered "industrial use"), if the future land use should change, the cleanup levels and associated risks should be reevaluated. Furthermore, evaluation of the potential for a vapor intrusion pathway should be considered as part of any future land transfer and/or change in land use.*

### OU3

*Using USEPA guidance, the Army should evaluate the vapor intrusion to indoor air pathway to verify that there are no concerns for OU3.*

*The USEPA, MPCA, MDH, and Army should continue to monitor the USEPA's progress towards finalizing a health risk assessment for trichloroethene, and any subsequent effect upon the selected cleanup level for OU3. In addition, the MDH HRL revision process should be tracked to see if there would be any impact on cleanup levels for other chemicals.*

*At the end of the five-year standby period (December 2004), if the monitoring data supports, a ROD amendment should be executed.*

### Grenade Range and Outdoor Firing Range

*The Army, USEPA, and MPCA need to work towards resolution of LUC issues.*

### **Protectiveness Statement:**

*The conclusion supported by this review is that the remedies for OU1, OU2, OU3, the Grenade Range, and the Outdoor Firing Range are functioning as intended, and that the components of the remedies remain protective of human health and the environment.*

### **Other Comments:**

*None.*

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## 1.0 Introduction

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A five-year review was performed for the New Brighton/Arden Hills (NB/AH) Superfund Site, which is related to the Twin Cities Army Ammunition Plant (TCAAP). The purpose of a statutory five-year review is to evaluate whether the remedies at this site remain protective of human health and the environment at those sites where hazardous substances remain on-site at levels that do not allow for unlimited use and unrestricted exposure. Records of Decision (RODs) for this Site were signed between 1992 and 1997. The first five-year review of the NB/AH Site was signed on September 30, 1999, and the passage of another five years has triggered this review. The prior report covered data through the end of Fiscal Year 1998 (FY 1998). This Five-Year Review covers the period from FY 1999 through FY 2003 (October 1, 1998, through September 30, 2003).

The 1999 five-year review did not identify any deficiencies that required follow-up; however, it did make recommendations for adjustments to remediation systems in light of cleanup progress. The recommendations are listed below, and detailed discussion of these items is included in Sections 4.0 through 6.0 of this five-year review report.

- Operable Unit 1: Conduct additional evaluation of containment and optimum pumping rates for the containment wells since they were just reaching their design capacities at the time of the review.
- Operable Unit 2: 1) Consider termination of the SVE systems at Sites D and G, 2) consider shutting off some of the clean extraction wells at Site A, and 3) consider shutting off some clean extraction wells for the deep groundwater and implement the recommendations of the optimization study when finalized.
- Operable Unit 3: Re-evaluate the need for the level of hydraulic containment in light of the plume stability and declining contaminant concentrations.

The U.S. Army (Army), TCAAP, performed this statutory five-year review under Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), for review by the U.S. Environmental Protection Agency (USEPA), Region 5, and the Minnesota Pollution Control Agency (MPCA). The review was initiated with a stakeholder kick-off meeting on January 6, 2004, and the majority of the Army's technical review was completed by April 2004. The USEPA Comprehensive Five-Year Review Guidance (June 2001) was utilized in conducting the five-year review and preparing this report.

This five-year review evaluates the remedies specified in the RODs for the three operable units at the NB/AH Site: Operable Unit 1 (OU1), OU2, and OU3. It also includes the removal actions that were implemented at the Grenade Range and Outdoor Firing Range. USEPA policy is to include removal actions in five-year reviews if, after the site closeout report has been submitted, hazardous substances remain on-site at levels that do not allow for unlimited use and unrestricted exposure (applicable to both of these sites). Two other sites that are being addressed as removal actions, the 135 and 535 Primer/Tracer Areas, were in the process of being investigated/evaluated at the end of FY 2003 and will not be included in this five-year review since final decisions on the need for remedial action and remedy selection have not yet been made (and thus the trigger of submitting a closeout report has not yet been reached). A brief discussion of the status of these two sites is included in the next section.

Sites B, F, and J, which do not contain hazardous substances at levels that would prevent unlimited use and unrestricted exposure, are not included in this review. As background information, brief discussion of Site B is included in Section 5.0, since it is a site that was included in the OU2 ROD. Brief discussion of Sites F and J is included in Section 3.4, as background information.

One additional site, the Site C Phytoremediation Corrective Action, is not included in this five-year review. This site was initially addressed as an MPCA enforcement action and was not included in any of the RODs. Given that enforcement action negotiations were still in progress

between the Army and MPCA at the end of FY 2003, this site was not included in this five-year review. A brief discussion of the status of this site is included in the next section.

The level of detail in this five-year review report is sufficient for the intended purpose of evaluating whether the remedies remain protective. For additional information on the background, investigations, and remedial actions for the various operable units and individual sites, it is suggested the reader refer to some other key documents such as the Annual Performance Reports, Installation Action Plans (produced annually), Records of Decision, site closeout reports, and other "Reviewed Documents" listed in the report.



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## 2.0 Site Chronology

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The following is a summary of the key events for the NB/AH Site:

1941	TCAAP began producing ammunition
1978 - 1982	Contamination of the regional aquifer first discovered
Sept. 1983	NB/AH Superfund Site was placed on the National Priorities List (NPL)
Aug. 1987	Federal Facilities Agreement (FFA) signed
June 1989	ROD on Removal Action for PCB-Contaminated Soils Near Site D
Sept. 1992	OU3 ROD signed
Sept. 1993	OU1 ROD signed
May 1994	Public Health Assessment for NB/AH Superfund Site finalized by Agency for Toxic Substances and Disease Registry
Oct. 1997	OU2 ROD signed
Feb. 1999	Action Memorandum for Outdoor Firing Range Removal Action
Feb. 1999	Action Memorandum for Grenade Range Removal Action
Sept. 1999	First CERCLA Five-Year Review Report signed

Note that ROD amendments are anticipated for several sites, including OU1 and OU3 deep groundwater, and Sites C, D, G, I, and 129-15. These amendments are further discussed in the relevant sections of this report.

The following sites were in progress at the end of FY 2003, but were not included in the scope of this five year review, as discussed in Section 1.0:

### Primer/Tracer Areas

The 135 Primer/Tracer Area consists of Building 135 and associated structures and utilities that were used for the manufacture of small caliber ammunition primer and tracer

mixtures. The 535 Primer/Tracer Area consists of Building 535 and building foundations and grounds that were used for to the manufacture of primer, tracer, and incendiary mixtures. Preliminary assessment reports for both of these sites received regulatory approval in FY 2002. The 135 Primer/Tracer Area Site Inspection work plan received regulatory approval and site investigation fieldwork was completed in FY 2002. The 535 Primer/Tracer Area Site Inspection work plan received regulatory approval and the site investigation fieldwork was completed in FY 2003. Site investigation reports have been prepared for each of these sites, both of which were under Army review at the end of FY 2003.

#### Site C Phytoremediation Corrective Action

In FY 1997, the U.S. Army Environmental Center (USAEC) funded and implemented a technology demonstration study of phytoremediation of contaminated soil at Sites C and 129-3. Corn and mustard crops were planted and harvested during the growing seasons in FY1998 and FY1999. During the growing seasons, ethylenediaminetetraacetic acid (EDTA) and acetic acid were applied to the soils to improve the metals uptake by the crops, and had the unintended consequence of causing migration of lead from the soils into the shallow groundwater at Site C, which is present within a few feet from the ground surface. On August 10, 2000, the MPCA issued a Notice of Violation to the Army for the impacts to Site C shallow groundwater and surface water (primarily lead contamination) caused by the phytoremediation demonstration project, and required that the Army implement corrective actions. The Army installed a groundwater recovery trench to contain the plume, which was operated between November 2000 and July 2001. On July 6, 2001, the Army began operating three extraction wells to contain the plume (replacing recovery trench operation), with discharge of extracted groundwater (treated as necessary) to the sanitary sewer. At Site 129-3, the MPCA required investigation to determine if there were impacts to soil or groundwater. Testing showed the soil impacts did not extend beyond the depth of pre-existing contamination (which was subsequently remediated), and there were no impacts to groundwater. Enforcement action negotiations were still in progress between the Army and MPCA at the end of FY 2003.

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## 3.0 Background

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### 3.1 PHYSICAL CHARACTERISTICS

TCAAP is a government-owned facility located in the northern portion of the Minneapolis – St. Paul metropolitan area (with a population of about three million), in Ramsey County, and is surrounded by the cities of New Brighton, Arden Hills, Mounds View, and Shoreview, Minnesota, (Figure 3-1). For purposes of the TCAAP restoration program, the facility occupied approximately a four square mile area (approximately 2,370 acres) immediately east of U.S. Interstate Highway 35W and north of Ramsey County Highway 96 (i.e., this was the original TCAAP boundary as shown on Figure 3-2). Alliant Techsystems Inc. (Alliant) is the prime tenant on the installation; however, they have announced plans to discontinue manufacturing operations at TCAAP in 2004. Tecumseh/Wenck Installation Support Services (TWISS) is the current contracted operator.

Remedial investigations performed at TCAAP and the surrounding areas have identified four geologic units of importance on and around TCAAP (Figure 3-3 illustrates the geologic units conceptually). Unit 1 is an unconsolidated unit with intermixed beds of sand and clay found on the surface at many locations at TCAAP. Unit 1 contains groundwater, but the aquifer yield is low and the water is not used as a municipal water supply source by any of the surrounding communities. Sites A, I, and K are nominally referred to as “shallow groundwater sites”, since the groundwater contamination at these sites is located in Unit 1. Unit 2 lies beneath Unit 1 and is a glacial till deposit that behaves as an aquitard at TCAAP and as an upper confining layer off-TCAAP to the southwest. Unit 3, the Hillside Sand and the Arsenal Sand, lies beneath Unit 2 but is exposed at the surface in some areas of TCAAP. Unit 3 is a water-bearing formation with high water yield. Groundwater from Unit 3 has historically been utilized as a potable water supply. Unit 4 (located directly below Unit 3) is a major aquifer for the Twin Cities area, including the communities surrounding TCAAP. It consists of two bedrock units: the Prairie du

Chien group (referred to as Upper Unit 4), which overlies the Jordan sandstone (referred to as Lower Unit 4). Groundwater contamination that exists below TCAAP in Unit 3 and 4, and that exists in Unit 3 and 4 to the southwest of TCAAP, is nominally referred to as "deep groundwater" contamination, since the groundwater is located in these deeper geologic units. Figures 3-4 and 3-5 present a geologic cross section through TCAAP, along a line parallel to the direction of groundwater flow in the Unit 3 and 4 aquifer. The line of this section is labeled A-A' on plume maps discussed in Section 4, such as Figure 4-3. In addition to the geologic units, the cross section shows the vertical distribution of trichloroethene concentrations. Since Unit 3 is relatively thick, monitoring wells constructed within this unit are designated as "upper" (U), "middle" (M), or "lower" (L) to represent their relative depth. This labeling convention is used on various figures in this report.

### 3.2 LAND AND RESOURCE USE

TCAAP was constructed between August 1941 and January 1943, and formerly included 323 buildings with associated utilities and services to support production activities. TCAAP produced small-caliber ammunition and related materials, proof-tested small-caliber ammunition and items as required, and handled/stored strategic and critical materials for other government agencies. Production began in 1941 and then alternated between periods of activity and standby. The size of TCAAP has periodically shrunk as a result of property transfers. Most recently, between 2000 and 2002, approximately 1,521 acres were reassigned to the National Guard Bureau. The remaining 774 acres of TCAAP were declared excess to the needs of the Department of Defense in 2002.

The Minnesota National Guard uses the land held by the National Guard Bureau for military training purposes. Alliant has been the prime tenant on the installation, manufacturing military munitions and related materials, but will be closing its operations on TCAAP in 2004. With the remaining 774 acres being declared surplus to the federal government, the Army and other government agencies are working towards the transfer of this property from federal control. The

future property use is not known at this time, but will potentially be a mixture of recreational, residential, commercial, and industrial uses. Because OU2 soil has been remediated to site-specific cleanup levels based on industrial use, if the future land use should change, the cleanup levels and associated risks should be reevaluated.

A portion of the groundwater that is pumped from beneath TCAAP is treated for use as the TCAAP potable water supply. Groundwater flowing away from TCAAP is utilized for residential, commercial, industrial, and municipal water supply. The Prairie du Chien-Jordan aquifer is a major source for municipal water supplies, such as for the Cities of New Brighton and Saint Anthony.

### **3.3 HISTORY OF CONTAMINATION**

During the years of ammunition production, TCAAP generated industrial wastes that were disposed of using the accepted practices of the times, which included on-site dumping, burial, and open-burning. Between 1978 and 1982, contamination of the regional aquifer was discovered beyond the TCAAP boundary, and later, 14 different areas were identified at TCAAP as potential sources for groundwater contamination, soil contamination, or both. The contaminants included volatile organic compounds (VOCs), especially those commonly used as industrial solvents or degreasers (like trichloroethene), polychlorinated biphenyls (PCBs), and ammunition-related heavy metals. The drinking water supply of local communities, with a total population of approximately 33,000, was directly impacted by VOCs.

### **3.4 INITIAL RESPONSE**

Based upon the information gathered between 1978 and 1982, TCAAP was placed on the National Priorities List (NPL) in September 1983 and was designated as the New Brighton/Arden Hills (NB/AH) Superfund Site. It is ranked as the number one Superfund site in

Minnesota. The Site consists of contaminated areas within the original TCAAP boundary and those areas outside of the plant that are affected by contamination from the plant. The NB/AH Site has been divided into three operable units, principally due to the nature and extent of the contaminated groundwater plume on and off TCAAP. The plume is approximately 2-miles wide and 6-miles long.

The three operable units are depicted on Figure 3-6 and are defined as follows:

- OU1 consists of the deep groundwater "North Plume" of off-TCAAP contaminated groundwater.
- OU2 consists of on-TCAAP soil and groundwater contamination, including 14 suspected source areas designated as Sites A, B, C, D, E, F, G, H, I, J, K, 129-3, 129-5, and 129-15 (see Figure 3-7). OU2 also includes the area of the Site A shallow groundwater contamination that extends off the north end TCAAP. Remediation of Sites F and J was completed prior to the 1997 OU2 ROD.
- OU3 consists of the deep groundwater "South Plume" of off-TCAAP contaminated groundwater.

A number of actions were taken at this Site prior to signing of the RODs, as discussed below:

#### OU1

A temporary, followed by a permanent, granular activated carbon (GAC) treatment system was constructed for the City of New Brighton to treat the municipal water supply. The permanent system was completed in June 1990.

A temporary, followed by a permanent, GAC treatment system was constructed for the Village of St. Anthony to treat the municipal water supply. The permanent system is a

remedial action pursuant to a ROD signed in September 1986, and was completed in April 1991.

The Army provided municipal water supply hookup for the Lowry Grove Trailer Park and Arden Manor Trailer Park.

## OU2

Interim Remedial Actions (IRAs) at Sites D and G, implemented in January 1986 and February 1986, respectively, included the installation of soil vapor extraction (SVE) systems at both sites to remove VOCs from the soils, effectively reducing VOC migration to the groundwater. During their period of operation, the SVE systems at Sites D and G removed more than 220,000 pounds of VOCs from the soil.

PCB-contaminated soil east of Building 502 was excavated in 1986. These soils were stored in a storage building built as part of the PCB IRA at Site I. During August and September 1996, these soils were removed and disposed of at a Toxic Substances Control Act (TSCA) landfill, with approval of the USEPA and MPCA. In September 1989, the thermal treatment of 1,400 cubic yards of PCB-contaminated soil from Site D was completed. As part of this Site D work, the remedy allowed for soils with less than 50 milligrams per kilogram (mg/kg) of PCBs to be "secured in-place", in that they were backfilled into the lower part of the PCB excavation area, with approximately 4 to 6 feet of clean soils placed over the contaminated soil. A protective soil cover with a minimum thickness of two feet will be maintained over the soils that were "secured in-place", to prevent exposure to these soils.

In 1995, the cleanup of Site F was completed under the Resource Conservation and Recovery Act (RCRA). More than 25,000 tons of metal-contaminated soils were treated over a period of three years. The Site F Closure Report (1999) was approved by the MPCA (since the State has the lead for RCRA actions) and documented that this site was available for unlimited use and unrestricted exposure. Site J is a portion of TCAAP's

underground sanitary sewer that was cleaned out. Soils and groundwater along the sewer location were investigated and no contamination was found. The Final Site J Closure Report (1994) was approved by the MPCA and USEPA, and documented the absence of contaminants above background levels and recommended no further action.

Many actions have also been undertaken to clean up the contaminated groundwater. In 1986, groundwater extraction treatment systems were installed at Sites I and K as IRAs. In October 1987, the installation constructed the Boundary Groundwater Recovery System (BGRS) to contain and treat VOC-contaminated groundwater at the TCAAP's southwest boundary. In January 1989, the system was modified and expanded and became the TCAAP Groundwater Recovery System (TGRS).

In September 1988, the installation conducted an IRA at Site A to recover shallow VOC-contaminated groundwater via a single extraction well located near the source area. In 1994, the installation replaced the Site A IRA remedy with a boundary plume containment system designed to prevent the off-TCAAP migration of VOCs in shallow groundwater.

### OU3

In April 1994, the OU3 Plume Groundwater Recovery System (PGRS) was completed. In July 1994, the OU1/OU3 New Brighton/Fridley municipal drinking water interconnection became operational. This system allows New Brighton to pump water that is treated by the PGAC and the PGRS, but is not needed for its municipal use, to the City of Fridley for use in its municipal water system.

A Federal Facilities Agreement (FFA) was signed on August 12, 1987, between the Army, USEPA, and MPCA. These parties agreed to minor modifications to the FFA on:

- October 12, 1990
- February 5, 1992



- March 3, 1992
- November 23, 1993
- January 9, 1998
- May 12, 1998
- June 30, 1998

The requirements have been fulfilled for FFA Attachment 2 (Interim Remedial Actions), Attachment 3 (Remedial Investigation), and Attachment 4 (Feasibility Study). Activities are now geared towards fulfilling the requirements of FFA Attachment 5 (Remedial Design and Remedial Action).

### **3.5 BASIS FOR TAKING ACTION**

The contaminants of concern (COCs) present at each site, and specific to each media of concern, are summarized in Table 3-1.

A human health risk assessment for TCAAP was completed by the USEPA in April 1991. For groundwater contamination, potential receptors included TCAAP workers and local residents who rely on private or municipal wells that extract contaminated groundwater for water supply. The risk assessment evaluated the carcinogenic and non-carcinogenic risks associated with exposure to contaminated groundwater through exposure pathways of ingestion, inhalation during showering, and absorption through the skin during showering or bathing. Estimated increases in carcinogenic and/or non-carcinogenic risks that would result from exposure to contaminated groundwater exceeded acceptable levels as defined by the USEPA and MPCA.

For contaminated soils, the exposure pathways that were evaluated were based on an industrial use scenario, with potential receptors being TCAAP workers or occupants. Incidental ingestion and dermal contact were assumed to be the only significant routes for receptors to be exposed to contaminants in surface soils at the site (it was also noted that, during excavation activities,

workers could also be exposed to contaminants by inhaling vapors or dust, as well as through incidental ingestion and dermal contact). The health risk assessment found that carcinogenic and non-carcinogenic risks exceeded acceptable levels at most soil sites in OU2.

The Army conducted an ecological risk assessment for terrestrial habitats at the original TCAAP (U.S. Army Environmental Hygiene Agency, October 1991, final report approved by USEPA and MPCA). The risk assessment addressed on-TCAAP risks to plants and animals, and concluded that no significant risks exist. The Army is currently preparing a risk assessment for aquatic sites. The Tier II Ecological Risk Assessment Report for aquatic sites, prepared by the U.S. Army Center for Health Promotion and Preventative Medicine (USACHPPM), was undergoing resolution of regulatory agency comments at the end of FY 2003. In FY 2004, based on the findings of the final report, the risk managers will determine whether to consider a remedy through a feasibility study.

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## **4.0 Operable Unit 1 (OU1)**

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### **4.1 REMEDIAL ACTIONS**

#### **4.1.1 Remedy Selection**

The OU1 ROD, signed September 1993, prescribed the following components for the selected remedy:

- Providing an alternative water supply to residents with private wells within the north plume.
- Implementing drilling advisories that would regulate the installation of new private wells within the north plume as a SWCA.
- Extracting groundwater at the containment boundary in the north plume near County Road E.
- Pumping the extracted groundwater to the PGAC water treatment facility in New Brighton for removal of VOCs by a pressurized GAC system.
- Discharging all of the treated water to the New Brighton municipal distribution system.
- Monitoring the groundwater to verify the effectiveness of the remedy.

The ROD addressed the Remedial Action Objectives, which were previously developed as part of the OU1 Feasibility Study (July 1993), as follows:

- Prevent human exposure to water contaminated with carcinogens in excess of the Maximum Contaminant Levels (MCLs), Recommended Allowable Limits (RALs), and Health Risk Limits (HRLs) and having a total excess cancer risk for all contaminants of greater than  $10^{-4}$  to  $10^{-6}$ .
- Prevent human exposure to water with concentrations of noncarcinogens greater than MCLs, RALs, and HRLs or having a threshold noncancer hazard index greater than 1.0.
- Restore the aquifer to its highest use, i.e., potability, as defined by the most stringent and promulgated state and federal standards. Aquifer remediation would be considered complete when levels of contaminants are less than the applicable MCLs, RALs, or HRLs (as promulgated).
- Contain the plume within the boundary of County Road E (to the extent practicable) while also maximizing mass removal.
- Prevent ecological exposure to contaminants.

#### **4.1.2 Remedy Implementation**

Groundwater containment is provided by three primary municipal wells: New Brighton Municipal (NBM) #4, #14 and #15. NBM #3, which is located next to NBM#4, has been designated as an alternate containment/production well for times when one of the three primary wells is not in operation. NBM #5 and NBM #6 are considered secondary alternates. NBM #3 and #4 were pre-existing wells. NBM #14 and NBM #15 began pumping in December 1996 and

March 1998, respectively. Collectively, these extraction wells comprise the New Brighton Contaminated Groundwater Recovery System (NBCGRS).

The extracted groundwater is used as part of the New Brighton water supply system, and as such, New Brighton took the lead on design and construction of the system, and is responsible for operation of the system. New Brighton contracted Barr Engineering to provide design and construction oversight services. The Army is paying for the OU1 remedy.

The extracted water is treated in the PGAC treatment facility for removal of VOCs, and is then used as part of the municipal water supply. The PGAC is located approximately one-third mile south of Interstate 694 near Silver Lake Road. The PGAC was initially brought on-line in June 1990. In 1995, the Army provided the City of New Brighton with funding for the modifications to the PGAC that were required to implement the terms of the OU1 ROD (e.g., treating the added groundwater flow from NBM# 14 and #15).

The MDH SWCA was issued in June 1996. In addition to covering OU1, the SWCA also encompasses OU3 and the portion of the OU2 Site A shallow groundwater plume that extends off the north end of TCAAP. In June 1999, the MPCA requested that the MDH extend the boundary of the SWCA further to the southwest, to the Mississippi River and Marshall Avenue, to ensure that the southern boundary fully encompassed the plume. The MDH made this revision to the SWCA in December 1999. The current boundary is shown on Figure 4-1. This land use control (LUC), which consists of an institutional control, is being implemented in accordance with the Land Use Control Implementation Plan (LUCIP) for the AH/NB Site that was prepared by the Army (dated February 2003).

The Alternate Water Supply and Well Abandonment Program has been implemented and is an ongoing program maintained by the Army. The OU1 Alternate Water Supply Plan (Montgomery Watson, October 1995) provided documentation of the original program, including three key clarifications to the remedy component: 1) the program applies to other wells, in addition to residential wells (relative to the statement "residents with"); 2) the program includes well

abandonment; and 3) the program includes the OU3 deep groundwater plume and that portion of the OU2 Site A shallow groundwater plume that extends off the north end of TCAAP. The OU1 Alternate Water Supply Plan identified the criteria for determining which wells are eligible for an alternate water supply and/or abandonment. The process of identifying wells eligible for alternate water supply and/or abandonment is accomplished by maintaining a "well inventory." The well inventory is a database that was initially developed in 1992, and is currently updated annually as part of the Annual Performance Report (APR). For the purposes of the well inventory, a study area was established which encompasses the groundwater plume (the study area boundary is the same as the MDH Special Well Construction Area). The well inventory is intended to include all wells within the study area. Within the study area, areas of concern are defined by the edge of the groundwater plume, plus additional buffer area. The wells are grouped into categories based on factors such as location relative to the area of concern, type of use, active/non-active status, sealed, etc. The well inventory database currently identifies 937 water supply wells within the study area, of which 39 are in categories with the potential to be impacted. These 39 wells are sampled every four years to determine if they qualify for alternate water supply and/or abandonment. If new wells are discovered that have the potential to be impacted, they are sampled as soon as practical to determine if there is a concern. If at any time a well is found to be eligible for alternate water supply and/or abandonment, the Army sends a letter offer to the owner. If accepted, the Army schedules and pays for the work. Since inception of the program, two well owners have been provided an alternate water supply and eleven wells have been properly abandoned. Also, in 2000, the MDH prepared a Health Consultation that re-evaluated the risks associated with private well use for 18 wells at 7 locations. MDH concluded that the uses did not pose a health hazard.

Groundwater monitoring is conducted in accordance with groundwater monitoring plans that are reviewed and updated annually as part of the APR. The Army conducts the sampling related to OU1 performance monitoring and the private well sampling related to the Alternate Water Supply and Well Abandonment Program. Barr Engineering, on behalf of the City of New Brighton, conducts the extraction well and treatment system effluent sampling.

#### **4.1.3 System Operations/Operation and Maintenance (O&M)**

The City of New Brighton operates and maintains the PGAC facility and associated extraction wells and distribution system. The primary maintenance item for the PGAC system is changing out the GAC (each of the 16 treatment vessels contains 20,000 pounds of GAC, and the GAC in 8 of these vessels is replaced in each change-out event). The O&M procedures have been sufficient to ensure reliable water treatment to the drinking water standards, and to ensure that the pumping targets for extraction well flow rates are met with adequate consistency. No significant O&M problems are evident.

Annual O&M costs have ranged from \$1.1 to \$1.9 million, with an average of \$1.6 million, versus the original O&M cost estimate of \$0.7 million. One reason for the higher costs is that carbon change-outs are occurring every 6 months (versus every 12 months as assumed for the original estimate). Also, the original estimate is now over 10 years old, which also accounts for some of the disparity. Additional information on the O&M cost breakdown is attached to the OU1 site inspection checklist (Appendix A.2).

#### **4.2 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW**

The prior Five-Year Review concluded that the components of the OU1 remedy remained protective of human health and the environment, that the alternate water supply and well abandonment program, along with the SWCA, were mitigating potential risks associated with private wells, and that the PGAC was effectively providing a safe municipal water supply. However, this report had noted that the third containment well had started pumping just prior to report preparation, and that additional evaluation would be needed to ensure that adequate containment is being achieved. The only recommendation for OU1 in the prior Five-Year Review was to conduct additional evaluation of containment and optimum pumping rates. Evaluation of containment has been conducted by the Army on an annual basis as part of the APR, and is discussed in this Five-Year Review (Section 4.4).

## **4.3 FIVE-YEAR REVIEW PROCESS**

### **4.3.1 Administrative Components**

A Five-Year Review project kick-off meeting was initially scheduled at the September 3, 2003 Technical Review Committee (TRC) meeting. In December 2003, the Army sent follow-up notification of the kick-off meeting to the USEPA, MPCA, Alliant, Army National Guard, USAEC, USACE, City of New Brighton, and the Restoration Advisory Board (RAB). The project kick-off meeting was held at TCAAP on January 6, 2004, and served to establish the scope of the five-year review, schedule, the methods of community notification/involvement, and report content/format.

### **4.3.2 Community Notification and Involvement**

Initial community notification and involvement was accomplished by involving the City of New Brighton and the RAB in the project kick-off meeting, as described above. A notice indicating that a Five-Year Review was to be performed for the NB/AH Site was published on or about February 15, 2004, in the following newspapers: Minneapolis Star Tribune, Shoreview-Arden Hills Bulletin, New Brighton-Mounds View Bulletin, and the Fridley Focus (Appendix B). The Army also prepared and distributed an Update newsletter on February 13, 2004, regarding the five-year review process. The notice and Update newsletter invited anyone interested in this process to contact TCAAP (Mike Fix); however, no responses were received.

A notice indicating that a draft five-year review report was available for public review and inviting comments thereto was sent to these same newspapers with the 30-day public comment period running from May 5 to June 4, 2004 (Appendix B). Comments were received from one individual, who also is a RAB member. The comments and responses are included in Appendix B, and revisions were incorporated into this document as appropriate.



### **4.3.3 Document Review**

The primary documents reviewed for OU1 were the following:

- Record of Decision - Groundwater Remediation, Operable Unit 1, September 1993
- TCAAP FY 2003 Annual Performance Report (APR), Draft, February 2004
- TCAAP Final APRs for Fiscal Years 1999, 2000, 2001, and 2002
- Previous Five Year Review Report, September 1999

The OU1 ROD was the source of information for remedial action objectives and cleanup levels. The FY 2003 APR was the primary source for monitoring data and for determining status at the end of this Five-Year Review period.

### **4.3.4 Data Review**

The status of OU1 remedial actions is summarized in Table 4-1.

The first remedy component, the alternate water supply program, has resulted in the Army providing an alternate water supply connection for two well owners. As part of this program, a total of 11 impacted private wells have also been properly abandoned. At the end of FY 2003, there were no additional private wells that were scheduled to receive an alternate supply and/or well abandonment, or that were eligible to receive an Army offer to enter the program.

The SWCA designated by MDH satisfies remedy component #2 and is accomplishing its purpose of notifying water well installers of the contaminated groundwater in the area. The adjustments that were made to the SWCA boundaries in December 1999 yielded an SWCA boundary that fully encompassed the plume.

Groundwater containment (remedy component #3) is being accomplished through continual pumping of wells NBM #4, #14, and #15 (with wells NBM #3, #5 and #6 serving as alternates,

as described previously). The degree of containment remains under discussion between the Army, USEPA, MPCA, City of New Brighton, and Restoration Advisory Board (see Section 4.5 for further discussion of this issue). In the meantime, the extraction system has continued to operate.

The NBCGRS has generally been meeting its overall pumping targets. Looking at the most recent year's pumping data (FY 2003), the NBCGRS, as a whole, exceeded the monthly targets in all months during FY 2003. However, it was noted that the pumping targets for the NBCGRS were reduced during the GAC change-out periods. Looking at the total NBCGRS pumping volume for FY 2003 of 1470 million gallons, the average monthly pumping volume (if pumping was at a uniform rate) would be about 122 million gallons. Compared with the typical monthly pumping target of about 100 million gallons in the normal operating condition, it is clear that the NBCGRS pumped substantially more than the minimum target rate (even without allowing a reduction in the pumping targets during GAC change-out periods). The overall adherence to the pumping targets supports the interpretation that the extraction system is providing substantial containment in the Prairie du Chien.

Figure 4-2 shows water level data, groundwater elevation contours, the 1 microgram per liter (ug/l) trichloroethene plume contour, and approximate capture limit for Upper Unit 4 (Prairie du Chien) based on data from Summer 2003. The contours on Figure 4-2 show the influence of pumping and suggest that the extraction wells are containing the contamination in the Prairie du Chien along the required boundary across the plume. Pumping volumes and VOC mass removal for FY 2003 are shown in Table 4-2. The trichloroethene plume in Upper Unit 3, Lower Unit 3, and Upper Unit 4 is shown on Figures 4-3, 4-4, and 4-5, respectively.

Trend graphs for trichloroethene in NBM #3, #4, #14 and #15 are shown on Figure 4-6. At NBM #3, trichloroethene decreased dramatically between 1994 and 1998, then stabilized between 1998 and 2000, then increased slightly between 2000 and 2002, and has decreased slightly since then. NBM #4 also exhibits a similar decrease between 1994 and 1998, and has been relatively stable since then. NBM #14 has generally shown a decreasing trend since its

startup in December 1996, though there was an upward spike in the latter part of 2003 (not in excess of typical concentrations observed in 2002). NBM #15 fluctuated between its startup in March 1998 and 2000, decreased slightly during 2001, and has been relatively stable since then. While not conclusive in and of itself, the decreasing water quality trends at the extraction wells support the interpretation that the OU1 system is making progress towards aquifer restoration.

Over the long-term, monitoring well water quality data is useful in evaluating containment. If containment is being achieved, decreases in contaminant concentrations should be evident in wells near and downgradient of the extraction wells. Trend graphs for all of the OU1 monitoring wells that are routinely monitored are included in Appendix B of the FY 2003 APR. These graphs best illustrate the long-term changes that have occurred throughout OU1. Wells both upgradient and downgradient of the extraction system generally show decreasing concentration trends. Decreases in concentrations can be attributed to a combination of:

- 1) Plume containment at the TCAAP boundary,
- 2) Mass removal through the OU1 extraction system, and
- 3) Natural attenuation.

Natural attenuation is not the prescribed remedy for OU1. However, since the previous Five-Year Review, USEPA and MPCA published the results of a case study on natural attenuation at TCAAP (2000). The report concluded, "that natural biodegradation complements the on-going efforts to extract contaminated groundwater at the source, and should greatly reduce the time required to reduce the concentration of contaminants to USEPA drinking water standards."

Treatment of extracted groundwater in the PGAC water treatment facility (remedy component #4) continues to provide effective treatment prior to its discharge into the City of New Brighton municipal water distribution system (remedy component #5). The treatment system is comprised of eight GAC vessels plumbed in parallel. Another eight GAC vessels are plumbed in series with the first eight to provide back-up treatment. Routine sampling occurs between the two sets of GAC vessels, such that when a detection occurs, a clean set of GAC vessels is present

downstream of the sampling point. Upon detection, change-out of carbon in the lead vessels is conducted as soon as possible (typically about 1 month later). Upon changing carbon, the direction of flow is reversed so that the eight vessels with the new carbon become the downstream vessels (the “clean” vessels are always rotated into the downstream position). PGAC effluent water quality for FY 2003 is documented in Table 4-3, clearly showing the effectiveness of the treatment system. Table 4-3 shows that two carbon change-outs occurred in FY 2003: one in January/February 2003 that was triggered by breakthrough detection, and one in April/May 2003, which was electively done to avoid having to conduct a change-out during the peak demand months of the summer (breakthrough had not yet been detected). The sampling results that represent PGAC effluent water quality are highlighted in Table 4-3 for ease of viewing the compliance portion of the data. There were no detections of VOCs in the samples representing PGAC effluent water quality.

Remedy component #6, groundwater monitoring, continues to be conducted to verify the performance of the remedy. Each fiscal year, a revolving, five-year monitoring plan is prepared by the Army and submitted to the USEPA and MPCA for approval via the APR. Although it covers five years, it is submitted on an annual basis to allow for minor changes to be made which streamline or improve the quality of the monitoring data to be collected.

Based on OU1 groundwater quality data presented in the FY 2003 APR, two VOCs exceed the cleanup levels specified in the OU1 ROD: trichloroethene and 1,1-dichloroethene.

Trichloroethene concentrations range up to 680  $\mu\text{g/l}$  with a cleanup level of 5  $\mu\text{g/l}$ . 1,1-Dichloroethene concentrations range up to 43  $\mu\text{g/l}$  with a cleanup level of 6  $\mu\text{g/l}$ .

In FY 2003, the PGAC treated nearly 1.5 billion gallons of water and removed 835 pounds of VOCs. Approximately 16,814 pounds of VOCs have been removed since system startup.

#### **4.3.5 Site Inspection**

The Army, USEPA, MPCA, City of New Brighton, RAB, and other parties as shown on the list of attendees in Appendix A.1 conducted a site inspection on March 2, 2004. A site inspection checklist for OU1 was completed and is included as Appendix A.2. Much of the information was obtained prior to the site inspection through phone interviews and review of available documents. The nearly complete checklists were then verified as the site inspection was conducted and any data gaps or modifications were discussed. (This approach was utilized for all site inspection checklists completed for this five-year review.)

The OU1 site inspection included the PGAC water treatment facility and one of the pump houses (NBM #3 and #4, which utilize the same pump house). The treatment plant operator (Kris Fluegel, City of New Brighton), the Public Works Director (Les Proper, City of New Brighton), and two people from the city's engineering consultant (Greg Keil and Janet Dalglish, Barr Engineering) were present to answer questions and guide the inspection. The plant was observed to be well maintained. A photograph of the plant is included in Appendix C. The computerized record-keeping system for the OU1 groundwater recovery system was demonstrated for the inspectors. Pumping records, effluent sampling results, maintenance information, and other data are routinely entered and can be viewed graphically to facilitate data analysis.

No significant problems or issues were identified as a result of the site inspection.

#### **4.3.6 Interviews**

Other than the individuals that were present at the site inspection to answer questions and guide the inspection (as named in the previous section), no interviews were conducted. Discussions with these individuals did not reveal any significant problems or issues.

## 4.4 TECHNICAL ASSESSMENT

### 4.4.1 *Question A: Is the Remedy functioning as intended by the decision documents?*

The review of remedial action objectives, documents, and monitoring data suggest that the remedy is functioning as intended by the ROD; however, the degree of containment in the Prairie du Chien remains under discussion between the Army, USEPA, and MPCA (see Section 4.5 for further discussion of this issue). Decreasing water quality trends suggest that aquifer restoration is occurring. The PGAC continues to reliably treat recovered groundwater to drinking water standards. The MDH SWCA and alternate water supply program continue to function as intended.

The O&M procedures remain adequate, given that the extraction system is effectively containing contamination in the Prairie du Chien aquifer and that the PGAC continues to reliably treat recovered groundwater to drinking water standards. No changes to O&M procedures appear to be necessary. There have not been frequent equipment breakdowns, significant periods of unanticipated downtime, or O&M cost issues that would suggest any potential remedy problems.

The primary opportunity for optimization is related to the potential amendment to the ROD (see Section 4.5). No other opportunities were identified.

The LUCs at this site are the MDH SWCA and alternate water supply program, both of which continue to function as intended. No changes are necessary for these remedy components.

### 4.4.2 *Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?*

The assumed route of exposure to contaminated groundwater remains valid (i.e., ingestion, inhalation during showering, and absorption through the skin during showering or bathing). No

new exposure routes are applicable. No changes in land use have occurred that would have a bearing on the remedy. No new contaminants or contaminant sources have been identified.

The cleanup levels for OU1 are listed Table 3-1. These were based on consideration of the following Applicable or Relevant and Appropriate Requirements (ARARs), as identified in the OU1 ROD (pages 19 and 20):

- Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs) specified in the National Primary Drinking Water Regulations (40 CFR Part 141), which apply to public water supplies, and which were established by the USEPA in accordance with the Safe Drinking Water Act (SDWA).
- Health Risk Limits (HRLs) specified in Minnesota Rules (4717.7100 to 4717.7800), which can be applied to private water supplies, and which were established by the MDH in accordance with Minnesota's Groundwater Protection Act of 1989.
- Recommended Allowable Limits (RALs) for Drinking Water Contaminants, Release 3, January 1991, prepared by the MDH.

The MDH RALs are no longer in use and have been superseded by the MDH's establishment of HRLs. State of Minnesota MCLs are another potential ARAR that was not identified in the OU1 ROD; however, the State of Minnesota adopted the Federal MCLs. Therefore, consideration of State of Minnesota MCLs would have no impact on potential cleanup levels. The cleanup levels developed in the OU1 ROD utilized the lowest value among the MCL, non-zero MCLG, HRL, and RAL. At the time of the OU1 ROD, two of the MCLs were identified as proposed, and only two HRLs were available (both identified as proposed). The review of the current regulations revealed that, for all six OU1 COCs, there are MCLs, MCLGs, and HRLs that have been established (none of which are qualified as proposed). Using the current regulations, and applying the same methodology for identifying cleanup levels (i.e., using the lowest value among

the MCL, non-zero MCLG, and HRL), yields the same cleanup levels that are listed in Table 3-1. No changes to the cleanup levels need to be considered, based on this review.

The remedial action objectives identified in the OU1 ROD remain valid, subject to the potential amendment to the ROD (see Section 4.5). No new objectives are proposed.

**4.4.3      *Question C: Has any other information come to light that could call into question the protectiveness of the remedy?***

No information has been obtained that could call into question the protectiveness of the remedy.

**4.4.4      Technical Assessment Summary**

Based on the remedial action objectives, the data reviewed, and the site inspection, the remedy is functioning as intended by the OU1 ROD, with the possible exception of the containment issue discussed in Section 4.5. O&M information and costs do not suggest any potential remedy problems. No changes in land use or exposure scenarios have occurred that would affect the protectiveness of the remedy. The ARARs used in establishing cleanup levels have undergone some changes (proposed values in regulations have become final, more MDH HRLs have been established, and MDH RALs are no longer applicable); however, none of these changes suggest that a change to the cleanup levels should be considered. No information has been obtained that could call into question the protectiveness of the remedy.

**4.5            ISSUES**

The degree of containment achieved by the NBCGRS remains under discussion between the Army, USEPA, and MPCA. There has been agreement between the three parties that “substantial containment” and aquifer restoration are occurring. The parties also agreed that criteria other than complete containment in the vicinity of County Road E would likely be more



indicative of successful remedy performance. Therefore, it was agreed to develop new indicators for verifying progress and cleanup of the plume through measurement of overall plume shrinkage (geographically) and decreasing contaminant concentrations, and to implement this through execution of a ROD amendment. The Army, USEPA, MPCA, Restoration Advisory Board, and City of New Brighton have been meeting as a Technical Group to provide input to the regulators on technical issues regarding monitoring wells, frequency of sampling, and how to evaluate the data. These multi-party discussions also included the Jordan aquifer and Army's plan to install three additional Jordan monitoring wells in 2004. Data from the new Jordan wells will help determine the feasibility of the contemplated ROD modification. These discussions are anticipated to be completed in FY 2004, which will enable the ROD amendment process to move forward.

On November 29, 2002, USEPA published draft guidance for evaluating the vapor intrusion to indoor air pathway from contaminated soil and groundwater. With respect to OU1, there is contaminated groundwater below residential homes. Given the depth to the contaminated groundwater, and the presence of a clay till layer in between the contamination and the ground surface, the vapor pathway is not expected to represent a concern. Nonetheless, it would be appropriate to consider the draft guidance for OU1.

On January 7, 2002, the MDH issued an interim exposure limit for trichloroethene of 5 ug/l (versus the MDH HRL of 30 ug/l). This interim limit was prompted by the USEPA's release of a draft health risk assessment for trichloroethene, which suggested that toxicity values for trichloroethene might be lower than the values that had previously been posted in the USEPA's Integrated Risk Management System (IRIS). The MDH is not likely to establish a new trichloroethene HRL until the USEPA's health risk assessment is final. If the HRL is ultimately revised and is 5 ug/l or higher, the new HRL would have no bearing on the OU1 cleanup level of 5 ug/l. If the HRL is ultimately revised and is lower than 5 ug/l (or if the MCL were to be lowered), the potential effects on the OU1 cleanup level would need to be considered. The MDH is in the process of reviewing and revising the HRLs for a number of chemicals, not just trichloroethene. Revised HRLs need to be promulgated through rulemaking, and it is anticipated

that this process will be culminated in 1-2 years. Revisions to the HRLs may have an impact on the groundwater cleanup levels for other chemicals observed in OU1.

#### **4.6 RECOMMENDATIONS AND FOLLOW-UP ACTIONS**

The Army, USEPA, MPCA, RAB, and City of New Brighton should resolve technical issues and proceed with the process of a ROD amendment.

Using USEPA guidance, the Army should evaluate the vapor intrusion to indoor air pathway to verify that there are no concerns for OU1.

The USEPA, MPCA, MDH, and Army should continue to monitor the USEPA's progress towards finalizing a health risk assessment for trichloroethene, and any subsequent effect upon the selected cleanup level for OU1. In addition, the MDH HRL revision process should be tracked to see if there would be any impact on cleanup levels for other chemicals.

#### **4.7 PROTECTIVENESS STATEMENT**

The components of the OU1 remedy remain protective of human health and the environment. The alternate water supply and well abandonment program, along with the SWCA, are mitigating potential risks associated with private wells. The PGAC is reliably providing a safe municipal water supply. Evaluation of pumping rates and water quality trends support the interpretation that the extraction system is effectively containing contamination in the Prairie du Chien aquifer, though the containment requirement may be replaced with a requirement for demonstrating that the plume is not spreading and that aquifer restoration is occurring (via a contemplated amendment to the ROD). Water quality trends suggest that progress towards aquifer restoration continues to occur. Review of the ARARs upon which the groundwater cleanup levels were based showed that no changes to the cleanup levels are needed.

## 5.0 Operable Unit 2 (OU2)

### 5.1 REMEDIAL ACTIONS

#### 5.1.1 Remedy Selection

The OU2 ROD, signed December 1997, prescribed the following components for the selected remedy:

- 1) Shallow Soil Sites: Sites A, C, E, H, 129-3, and 129-5 had inorganic and/or organic contaminants above site cleanup goals. Unpermitted landfills, or dumps, exist within Sites A, B, E, H, and 129-15. Sites B and 129-15 are included solely as dumps. The selected remedy for the shallow soil sites will attain the site cleanup levels specified in the OU2 ROD and will include the following activities:
  - Identification/characterization of contaminated soil boundaries, surface and subsurface debris for Sites A, C, E, H, 129-3, and 129-5;
  - Excavation and sorting of hazardous and non-hazardous materials, debris and ordnance for Sites A, C, E, H, 129-3 and 129-5;
  - Removal and disposal of ordnance, debris and oversized material for Sites A, C, E, H, 129-3, and 129-5;
  - On-site treatment (stabilization) of hazardous soils from Sites A, C, E, H, 129-3, and 129-5 in the TCAAP Corrective Action Management Unit (CAMU);
  - Off-site disposal of contaminated soils above site specific cleanup goals from Sites A, C, E, H, 129-3, and 129-5;

- Backfill/regrade excavations on Sites A, C, E, H, 129-3, and 129-5;
- Restrict site access and use during remedy implementation;
- Five-year period of groundwater monitoring to verify no adverse remedy impacts at Sites A, C, E, H, 129-3, and 129-5; and
- Characterization of dumps at Sites B and 129-15 to determine their contents. If contents are found to be toxic, hazardous, or contaminated, then a remedy for the landfill will be utilized and documented through a post-ROD Amendment or Explanation of Significant Difference (ESD). If the contents are not toxic, hazardous, or contaminated, a no further action remedy would be employed.

2) Deep Soil Sites (D and G): These sites have been impacted primarily by VOC contaminants at depths of 50 to 170 feet. Some additional shallow soil contaminants may exist at Site D. Site G also contains a dump. The selected remedy for these sites will attain the site cleanup levels specified in Table 1 of the OU2 ROD and will include the following activities:

- Groundwater monitoring;
- Restrict site access and use during remedy implementation;
- Install and operate deep soil vapor extraction (SVE) systems with a modified shallow SVE system;
- Evaluate and potentially use enhancements to the SVE systems;
- Maintain existing site caps;
- Maintain surface controls; and
- Following the completion of the SVE remediation of deep soils, characterize the Site D shallow soils and the Site G dump to determine the appropriate action.

3) Shallow Groundwater Sites (A, I, and K): These sites have been primarily impacted by VOCs. The selected remedy for Site A shallow groundwater will

attain the site cleanup levels specified in Table 1 of the OU2 ROD and includes the following activities:

- Groundwater monitoring to track plume migration and remedy performance;
- Use of existing gradient control wells to contain the contaminant plume and remove mass;
- Institutional controls to restrict new well installations and provide alternate water supplies and well abandonment as necessary;
- Discharge of extracted groundwater to a publicly owned treatment works (POTW); and
- Source characterization/remediation.

The selected remedy for Site I shallow groundwater will attain the site cleanup levels specified in Table 1 of the OU2 ROD and includes the following:

- Groundwater monitoring to track remedy performance;
- Use of an existing well to remove impacted Unit 1 groundwater;
- POTW discharge of extracted groundwater; and
- Additional characterization of the Unit 1 and Unit 2 soil and groundwater.

The selected remedy for Site K shallow groundwater will attain the site cleanup levels specified in Table 1 of the OU2 ROD and will include the following activities:

- Groundwater monitoring to track remedy performance;
- Installation of sentinel wells at the bottom of Unit 1 and to the top of Unit 3;

- Use of the existing interceptor/recovery trench to contain the plume and remove impacted groundwater;
- Treatment of extracted groundwater using air stripping;
- Discharge of treated groundwater to Rice Creek;
- Monitoring to track compliance with discharge requirements; and
- Additional characterization of the unsaturated Unit 1 soil.

4) Deep Groundwater: Includes the deep groundwater plume that underlies the southwestern portion of OU2 and originated primarily from Sites D, G, and I. The selected remedy for Deep Groundwater will attain the site cleanup levels specified in Table 1 of the OU2 ROD and includes the following activities:

- Groundwater extraction to hydraulically contain the contaminated groundwater source area to the 5  $\mu\text{g/l}$  trichloroethene concentration contour and optimize the removal of contaminants from the source area through pumping of selected wells;
- Groundwater treatment using air stripping;
- Discharge of treated groundwater to the on-site gravel pit;
- Institutional controls to restrict access to contaminated aquifers and prevent exposure to contaminated groundwater;
- Reviews of new and emerging technologies that have the potential to cost-effectively accelerate the timeframe for aquifer restoration. Reviews shall be performed by Army and reported on annually in accordance with the consistency provisions of the TCAAP Federal Facility Agreement; and
- Groundwater monitoring to track remedy performance.

LUCs were identified as remedy components for some of the above sites (as listed above), but as remedy implementation has progressed, additional LUCs have been selected by the Army, as established in the LUCIP. These LUCs are identified and discussed in Section 5.4.1

The ROD addressed the Remedial Action Objectives, which were previously developed as part of the OU2 Feasibility Study (March 1997), as follows:

1) Shallow Soil Sites:

Defined as the surface soils 0 to 12 feet below ground surface. The following remedial action objectives are designed to protect human health and the environment under the current and most probable future land use (industrial) scenario from exposure to contaminants in shallow soils at the TCAAP site:

- a) Prevent on-site human exposure by means of ingestion and dermal contact with contaminants in the surface soils.
- b) Prevent human exposure by means of ingestion, dermal contact, and inhalation of contaminants in shallow soils during any future construction activities at the site.
- c) Prevent the migration of contaminants from shallow soils to waters of the state that would result in dissolved contaminant concentrations in excess of ARARs and TBCs.

2) Deep Soil Sites (D and G): Defined as soils from 12 feet below ground surface extending down to the water table. The following remedial action objective is designed to protect human health and the environment from exposure to contaminants in deep soils at the TCAAP site:

- a) Prevent the migration of contaminants from deep soils to groundwater that would result in dissolved contaminant concentrations in excess of groundwater ARARs and TBCs.

- 3) Groundwater: Defined as the groundwater directly beneath the TCAAP site. The remedial action objectives are designed to protect human health and the environment from exposure to contaminants in groundwater beneath the TCAAP site.
- a) Prevent human exposure to water contaminated with carcinogens in excess of ARARs and having a total excess cancer risk from all contaminants of greater than  $10^{-4}$  to  $10^{-6}$ .
  - b) Prevent human exposure to water with concentrations of noncarcinogens greater than ARARs and having a threshold noncancer hazard index greater than 1.0.
  - c) Contain and control contaminated groundwater in the shallow Unit 1 groundwater aquifer to prevent further spreading and minimize the level of contaminants through mass removal.
  - d) Restore the contaminated aquifers to concentrations below ARARs and TBCs.
  - e) Contain the deep Units 3 and 4 groundwater plume source area while also maximizing mass removal.

### 5.1.2 Remedy Implementation

At Site B, characterization revealed that a no further action remedy was appropriate. Very little debris was observed in investigation trenches, indicating that little disposal had occurred at this site. The contents of the dump were determined not to be toxic, hazardous, or contaminated. No constituents were found to exceed the risk-based Preliminary Remediation Goals (PRGs), and thus no COCs were identified for Site B. The Site B Closeout Report received consistency in FY



2001. Since Site B does not contain hazardous substances at levels that would prevent unlimited use and unrestricted exposure, it is not covered by this five-year review.

Shallow soil site remediation was initiated in FY 1998 beginning with Site A. The TCAAP Corrective Action Management Unit (CAMU) was constructed to aid in cleanup of the sites. The CAMU consisted of a bermed, asphalt pad with lined ponds for storage of rainwater from the pad. As envisioned in the OU2 ROD, the CAMU was intended to be a central staging area, where soils from each of the individual sites would be brought for treatment prior to loading for off-site disposal at a permitted landfill. However, discovery of asbestos-containing material (ACM) at shallow soil sites in FY 1999 rendered further use of the CAMU impractical, because the additional safeguards necessary to control asbestos during handling defeated the cost savings associated with the central processing pad. It was found to be more convenient and cost-effective to treat the soil at each individual site. The CAMU was removed in late FY 2002 and early FY 2003. Closure included decontamination and removal of the storage pad and storm water holding ponds, testing beneath the pad and ponds, and groundwater monitoring. A CAMU Closeout Report (prepared by Shaw) was under regulatory review at the end of FY 2003, which states that there were no adverse impacts to soil or groundwater due to CAMU operations, and that no LUCs are required for this area.

#### Shallow Soil Sites

The shallow soil site remediation work has been completed at Sites A, E, H, 129-3, and 129-5, and is partially complete at Site C. Protective soil covers have been constructed over portions of Sites E and H where ACM remains in-place. The performance standard for these covers is two feet of common, granular borrow material. LUC and O&M requirements are discussed in Section 5.4.1. The five-year period of groundwater monitoring to verify no adverse remedy impacts at shallow soil sites was initiated in FY 2003. This sampling is being conducted in accordance with groundwater monitoring plans that are reviewed and updated annually as part of the APR. The dump investigation has been completed at Site 129-15, the selected remedy (protective soil cover) has been constructed, and an amendment to the OU2 ROD that will document remedy selection was being prepared at the end of FY 2003.

### Deep Soil Sites (D and G)

The remediation of VOC contamination (both shallow and deep soils) has been completed and the SVE systems have been dismantled (note that the 1999 five-year review report had recommended evaluating termination of these SVE systems). Investigation of Site D non-VOC contaminants has been completed, the selected remedy (excavation, treatment by stabilization, and off-site disposal) has been completed, and an amendment to the OU2 ROD that will document remedy selection was being prepared at the end of FY 2003. The Site D Closeout Report recommended that Site D be added to the list of shallow soil sites for the five-year period of groundwater monitoring (to verify no adverse remedy impacts). This sampling will be conducted in accordance with groundwater monitoring plans that are reviewed and updated annually as part of the APR. The Site G dump was determined to have been adequately characterized, and the selected remedy (maintaining the cover and improvements to the side slopes) was partially completed (construction of cover improvements was initiated in FY 2003 and is anticipated to be completed in FY 2004). An amendment to the OU2 ROD will be prepared to document remedy selection. Groundwater monitoring (for VOCs) near the vicinity of these sites is being conducted in accordance with groundwater monitoring plans that are reviewed and updated annually as part of the APR.

### Site A Shallow Groundwater

The containment system, which began operation May 31, 1994, originally consisted of eight extraction wells installed along two lines downgradient of the source area. Only four of the eight extraction wells (nearest to the source area) currently need to be operated to provide the necessary containment. Note that the 1999 five-year review had recommended evaluating the shutdown of some of the wells, and four wells were discontinued with regulatory approval. Extracted groundwater is discharged directly (i.e., no pretreatment is necessary) to the sanitary sewer for treatment at a Publicly-Owned Treatment Works (POTW). The MDH SWCA (issued in June 1996) encompasses the portion of the Site A plume that extends off the north end of TCAAP, and the Alternate Water Supply and Well Abandonment Program has been implemented and is maintained by the Army (refer to Section 4.1.2 for additional information). Source characterization has been completed, and the selected remedy (excavation and off-site

disposal) has also been completed. Sampling is conducted in accordance with groundwater monitoring plans that are reviewed and updated annually as part of the APR.

#### Site I Shallow Groundwater

Additional investigation work is complete. Results led to proposing a dual-phase extraction remedy (combining groundwater extraction and soil vapor extraction). However, pilot testing of a dual-phase extraction system determined that the technology was not feasible due to low permeability of the soils (a conclusion agreed to by USEPA and MPCA). An amendment to the OU2 ROD will be implemented to change the preferred remedy from groundwater pump and treat to a groundwater monitoring based remedy. The monitoring based remedy is appropriate since the Unit 1 plume is not migrating offsite; rather, the Unit 1 contaminants leak downward into Unit 3, where groundwater contamination is hydraulically contained by the TGRS. Sampling is conducted in accordance with groundwater monitoring plans that are reviewed and updated annually as part of the APR.

#### Site K Shallow Groundwater

The containment system, which began operation August 1986, consists of a groundwater extraction trench. Extracted groundwater is treated by air stripping prior to discharge to a storm sewer that, in turn, discharges to Rice Creek. Effluent water quality must meet the substantive requirements of Document No. MNU000579 (MPCA), which contains the state-accepted discharge limits for surface water. Sentinel well installation has been completed. The additional investigation work has been completed and the source area was further defined. Although not required by the OU2 ROD, pilot studies of two groundwater remediation technologies were conducted: Hydrogen Release Compound (HRC) and direct hydrogen injection with gas-permeable membranes. The use of HRC was not effective. The direct hydrogen injection yielded promising results, but was determined to not be cost effective. Sampling is conducted in accordance with groundwater monitoring plans that are reviewed and updated annually as part of the APR.

## Deep Groundwater

The Boundary Groundwater Recovery System (BGRS) was started on October 19, 1987, and consisted of six Unit 3 extraction wells located on TCAAP near the southwest property boundary. Six additional boundary extraction wells (in Unit 3 and Unit 4), and five source control wells (Unit 3) were added to this system, which became the TCAAP Groundwater Recovery System (TGRS). The expanded TGRS system began operation on January 31, 1989, providing hydraulic containment of contaminated groundwater to the 5  $\mu\text{g/l}$  trichloroethene concentration contour and providing source area contaminant removal. Due to narrowing of the plume width and due to modifications in the TGRS operating strategy, operation of some of the TGRS extraction wells has been ceased (B7, B10, B12, SC3, and SC4) and one extraction well has been replaced (B13 replaced B2). In FY 2003, the Army received agency approval on the TGRS Operating Strategy document, which satisfies the ROD requirement to optimize the TGRS. (Note that shutdown of some of the extraction wells and implementation of the finalized optimization study were recommendations in the 1999 five-year review report.) The Operating Strategy was based in part on findings from the 1989 Annual Monitoring Report and presented a Global Operation Strategy for the entire TGRS extraction system and a Micro Operation Strategy for selected well groups. Future evaluations will compare actual pumping rates to those rates presented in the Operating Strategy.

Extracted groundwater is directed to an air stripping treatment system. The TGRS can utilize two different options for treated water discharge: recharge at the Arsenal Sand and Gravel Pit, and discharge to the TCAAP elevated water tank. Water stored in the elevated tank is “softened” and then “polished” with granular activated carbon (GAC) prior to distribution to TCAAP users (water usage is approximately 55,000 gallons per workday, depending on the time of year). Currently, the Arsenal Sand and Gravel Pit option is utilized for the majority of treated water. New and emerging technologies that have the potential to cost-effectively accelerate the timeframe for aquifer restoration have been discussed in TRC meetings and in the APR. Sampling is conducted in accordance with groundwater monitoring plans that are reviewed and updated annually as part of the APR.

The LUCs (as identified in Section 5.4.1) are being implemented by the Army, National Guard, and Alliant in accordance with the LUCIP.

### **5.1.3 System Operations/Operation and Maintenance (O&M)**

For the soil sites, O&M procedures are limited to maintaining the cautionary signs around the perimeter of each protective soil cover. O&M would also include repair of any damage to a protective soil cover; however, no such damage occurred during the period of this Five-Year Review. Costs for O&M were not obtained or evaluated, due to the minimal nature of the O&M effort.

For the groundwater sites, the Army operates and maintains the Site A groundwater recovery system. Alliant operates and maintains the TGRS and the Site K groundwater recovery system. The O&M procedures have been sufficient to ensure reliable water treatment to the applicable standards, and to ensure that the pumping targets for groundwater extraction rates are met with adequate consistency. No significant O&M problems are evident. Annual O&M costs are summarized in the site inspection checklists (Appendix A). O&M costs for these sites have been less than or comparable to the original O&M cost estimates.

## **5.2 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW**

The prior Five-Year Review concluded that the components of the OU2 remedy remained protective of human health and the environment. No recommendations were made in the prior Five-Year Review for the shallow soil sites or Sites I and K shallow groundwater. It was recommended that the SVE system operation be terminated at Sites D and G, which has occurred as noted above. It was recommended to consider shutting off some of the clean extraction wells in the Site A shallow groundwater system, which has occurred as noted above. It was recommended to consider shutting off some of the clean extraction wells in the TGRS, which has occurred as noted above.

## **5.3 FIVE-YEAR REVIEW PROCESS**

### **5.3.1 Administrative Components**

Administrative components were as described for OU1 (see Section 4.3.1).

### **5.3.2 Community Notification and Involvement**

Community notification was conducted as described for OU1 (see Section 4.3.2).

### **5.3.3 Document Review**

The primary documents reviewed for OU2 were the following:

- ROD on Removal Action for PCB-Contaminated Soils Near Site D, June 1989
- Record of Decision - Operable Unit 2, October 1997
- Action Memorandum for Outdoor Firing Range Removal Action, February 1999
- Action Memorandum for Grenade Range Removal Action, February 1999
- TCAAP FY 2003 Annual Performance Report (APR), Draft, February 2004
- TCAAP Final APRs for Fiscal Years 1999, 2000, 2001, and 2002
- Previous Five Year Review Report, September 1999

The OU2 ROD was the source of information for remedial action objectives and cleanup levels. The FY 2003 APR was the primary source for monitoring data and for determining status at the end of this Five-Year Review period. Site Closeout reports were also reviewed, as necessary.

### **5.3.4 Data Review**

The status of OU2 remedial actions is summarized in Table 4-1.

area under this cover. The Closeout Report for Site H has been approved, but final consistency has not yet been provided.

Site 129-3 Remediation is complete. 3,460 cubic yards of metals-, nitroglycerine-, and VOC-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. The Closeout Report for Site 129-3 has been approved, but final consistency has not yet been provided.

Site 129-5 Remediation is complete. 100 cubic yards of metals-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. The Closeout Report for Site 129-3 has been approved, but final consistency has not yet been provided.

CAMU Use of the CAMU is completed. Closure included decontamination and removal of the storage pad and storm water holding ponds, testing beneath the pad and ponds, and groundwater monitoring. It was determined that there were no impacts to soil or groundwater from use of the CAMU. A CAMU Closeout Report (prepared by Shaw) was under regulatory review at the end of FY 2003, which states that there were no adverse impacts to soil or groundwater due to CAMU operations, and that no LUCs are required for this area.

Characterization work at Site 129-15 revealed that a protective soil cover was required due to lead and polynuclear aromatic hydrocarbon (PAH) contamination. The 1.6 acre cover was constructed in FY 2002. The Closeout Report for Site 129-15 has been approved, but final consistency has not yet been provided. An amendment to the OU2 ROD that will document remedy selection for Site 129-15 was being prepared at the end of FY 2003.

Final consistency on the Closeout Reports has been delayed at the above sites due to an issue related to LUCs (see Section 5.5 for discussion of federal-level debate between DOD and USEPA). Despite this debate, to ensure protectiveness of human health, the Army at TCAAP

prepared a Land Use Control Implementation Plan (LUCIP) as an interim measure to outline appropriate LUC actions. The LUCIP was submitted for regulatory review, but not approval, pending resolution of the federal debate. The LUCs (as identified Section 5.4.1) are being implemented by the Army in accordance with the LUCIP. The requirement to control site access at the shallow soil sites during remedial action was accomplished through maintenance of the existing TCAAP facility fence and locking gates.

The five-year period of groundwater monitoring to verify no adverse remedy impacts at Sites A, E, H, 129-3, and 129-5 was initiated in FY 2003. Since Site C shallow groundwater was known to be impacted (related to the Phytoremediation Demonstration), it was decided that Site C groundwater would not be monitored under the same "five-year program" as the other shallow soil sites since it is being addressed under the Corrective Action (this monitoring data is outside the scope of this Five-Year Review). Monitoring results at the other shallow soil sites for FY 2003 were all below the MDH HRLs or were below background concentrations, as applicable, suggesting that there were no impacts to groundwater due to soil remediation activities (see Table 5-1 for the data and Figure 5-16 for the well locations).

#### Deep Soil Sites (D and G)

Remedy component #1 for deep soil sites requires groundwater monitoring in the vicinity of the sites. Table 5-2 presents the FY 2003 data for the deep groundwater chemicals of concern for the seven wells nearest Sites D and G. The table shows that five of the seven wells still exceed the cleanup level for trichloroethene. The only other cleanup level exceedance among these seven wells is 1,1-dichloroethene in 03U094 (18 ug/l versus cleanup level of 6 ug/l).

During the years of SVE operation (1986 to 1998), trichloroethene concentrations in groundwater decreased from 10,000's to less than 800 µg/l. The most dramatic improvement has been at 03U093 (Figure 5-2). Overall, these results indicate that SVE systems at Sites D and G effectively minimized (or eliminated) further contamination of the deep groundwater beneath these sites. However, the contaminant concentrations are still up to 50 times greater than the cleanup levels. This suggests that residual contamination is acting as an ongoing source for



controls relative to VOCs in the soil. At Site G, the revised cleanup goal for trichloroethene was based on maintaining a cap with a specified permeability over the area with trichloroethene contamination (see discussion on land use controls and long-term O&M in Section 5.4.1). No significant problems have been observed relative to the clay cap or surface drainage controls.

Characterization of Site D shallow soils and the Site G dump (remedy component #7) has been completed. For Site D, shallow soil characterization work was completed in FY 2002. In FY 2003, 1381 cubic yards of soils contaminated with metals and nitroglycerin were excavated and transported off-site for disposal at a permitted disposal facility. A Site D Closeout Report was under regulatory review at the end of FY 2003. An amendment to the ROD to document the remedy selection for Site D shallow soils was being prepared at the end of FY 2003. For Site G, a technical memorandum recommending improvements to the Site G cover received regulatory approval in FY 2003. A work plan for the cover design also received regulatory approval in FY 2003. Cover construction was started in late FY 2003, and is anticipated to be completed in early FY 2004. The location of the Site G cover is shown on Figure 5-1. (Note that the Site D cover shown on this same figure is not related to the soil removal work for metals/nitroglycerin or VOCs, but is related to the PCB soils that were left in place as discussed in Section 3.4.). An amendment to the ROD to document the remedy selection for Site G is planned.

#### Site A Shallow Groundwater

Groundwater monitoring (remedy component #1) continues to be conducted to evaluate plume migration and remedy performance.

Groundwater containment and mass removal (remedy component #2) is being accomplished through operation of four extraction wells. The extraction well capture boundary is shown on Figure 5-3 (groundwater contour map). The plume extent is shown on Figure 5-4. Comparison of these two figures shows that the capture boundary encompasses the portion of the plume that is above cleanup levels. Pumping rates for the four extraction wells during FY 2003 are shown in Table 5-3. The FY 2003 average flow rate was 16.6 gpm, which exceeds the target rate of 15

gpm. The Site A groundwater extraction system removed 2.1 pounds of VOCs in FY 2003 and has reached 39 pounds as a cumulative total (Table 5-4).

Groundwater quality data from monitoring wells and extraction wells shows that tetrachloroethene is above the cleanup goal in and near the source area, but is below cleanup levels at the first line of extraction wells. There were no detections of cis-1,2-dichloroethene above cleanup goals in the June 2003 event; however, one extraction well that was just below the cleanup level in June 2003 was over the cleanup level in December 2002. The site data suggests that tetrachloroethene is degrading to trichloroethene and then to cis-1,2-dichloroethene as it travels away from the source area.

With regard to system performance, iron fouling has been a significant problem for this recovery system. Extraction well pumps and other components require frequent cleaning and/or replacement.

The SWCA includes the off-site portion of the Site A groundwater plume. Also, the Alternate Water Supply and Well Abandonment Program is underway and was expanded to cover the area affected by the OU2 Site A shallow groundwater plume (both on-site and off-site). Remedy component #3 is therefore in place. Currently, there are no well owners that need to be contacted and there are no pending water supply hookups or well abandonments. The established program continues to meet the intent of this remedy component.

Extracted groundwater is discharged to the city of Shoreview's sanitary sewer in accordance with remedy component #4. Effluent water quality results for FY 2003 are shown in Table 5-5 and have consistently met the discharge limits, as specified in Industrial Discharge Permit Number 2194 from the Metropolitan Council Environmental Services (MCES).

The fifth remedy component, source characterization and remediation, has been completed. Site A was characterized in 1997. Removal of metal-contaminated soils has been completed (as previously discussed). The source of VOC contamination in groundwater was identified (the

former 1945 Trench). Construction of an air sparging/soil vapor extraction (AS/SVE) system to remediate VOC-contaminated soils was completed in FY 2000, and began operation in early FY 2001. The AS system was being implemented voluntarily by the Army and was not a requirement of the OU2 ROD. The AS system was operated minimally in FY 2001 and was shut off permanently in June 2001 due to a lack of increase in SVE VOC levels and due to concern regarding potential plume spreading. Soil samples were collected within the source area in August 2001 and July 2002. In both events, the results showed minimal reduction in soil VOC concentrations. Since it appeared that many years of SVE system operation would be required before cleanup levels would be reached (if ever), the Army ceased SVE system operation on August 21, 2002, and obtained approval from the USEPA and MPCA to excavate the VOC-contaminated soils in the source area. 688 cubic yards of contaminated soil (non-hazardous soil) were excavated and transported off-site to a permitted disposal facility. The Site A Former 1945 Trench Closeout Report was under regulatory review at the end of FY 2003.

#### Site I Shallow Groundwater

Groundwater monitoring continues to be conducted as required by remedy component #1. Monitoring results continue to show chlorinated VOCs above cleanup levels in Site I shallow groundwater. Groundwater elevations are shown on Figure 5-5. Groundwater quality data is shown in Table 5-6.

Remedy components #2 and #3 (groundwater extraction and discharge to sanitary sewer) will not be implemented, as discussed below.

Remedy component #4, additional characterization of soil and groundwater, has been completed. The additional investigation resulted in a pilot study to evaluate the applicability of dual-phase vacuum extraction technology (combining groundwater extraction and soil vapor extraction) at the site. The report on the dual-phase vacuum extraction pilot test, approved by the USEPA and MPCA, concluded that neither dual-phase extraction nor groundwater extraction is feasible. The pilot test found that the soil permeability is low. The report recommended that no further remedial action is considered until the building is demolished. An amendment to the OU2 ROD

to change the preferred remedy from groundwater pump and treat to a groundwater monitoring based remedy is planned.

#### Site K Shallow Groundwater

Groundwater monitoring continues to be conducted at Site K (remedy component #1). Results continue to show that chlorinated VOCs are present above cleanup levels. Trichloroethene and cis-1,2-dichloroethene range up to 16,000  $\mu\text{g/l}$  and 1,800  $\mu\text{g/l}$ , respectively, versus cleanup levels of 30 and 70  $\mu\text{g/l}$ .

Remedy component #2 required installation of sentinel wells at the bottom of Unit 1 and the top of Unit 3 (to determine if any vertical migration is occurring). The upper Unit 3 sentinel well (03U621) was installed in February 2000. Existing piezometers (01U625D, 01U626D, 01U627D and 01U628D) were used to accomplish the deep Unit 1 sentry monitoring. These piezometers monitor the base of the Unit 1 aquifer near the trench. Monitoring results verified that dense non-aqueous phase liquids (DNAPLs) are not migrating beneath the trench along the Unit 1/Unit 2 interface and continue to verify that contamination has not migrated into Unit 3.

Hydraulic containment (remedy component #3) is being achieved as shown by comparison of Figure 5-6 (groundwater contour map) and Figure 5-7 (plume map). The trench extracts groundwater at an approximate rate of 8 gpm (monthly groundwater extraction volumes during FY 2003 are shown in Table 5-7).

Groundwater treatment is accomplished via an air stripping treatment system. The original air stripping tower and controls were replaced with a new fluidized-bed type air stripper system on June 21, 1999. The new air stripper is less prone to fouling and requires less maintenance, and has provided reliable treatment.

Discharge of treated water to Rice Creek and the associated discharge monitoring are required by remedy components #5 and #6. The treated water consistently meets the substantive requirements of Document No. MNU000579 (MPCA). Influent and effluent analytical data for

FY 2003 is shown in Table 5-8. The Site K system removed 7.1 pounds of VOCs from the aquifer in FY 2003 and has reached 138 pounds as a cumulative total (Table 5-7).

Additional investigation (remedy component #7) has been completed. The investigation results report, approved by the USEPA and MPCA, defined the extent of VOC contaminated soils beneath Building 103 and refined the location of the source area.

#### Deep Groundwater

Hydraulic containment and source area contaminant removal (remedy component #1) is being accomplished through operation of the TGRS. The TGRS system layout is shown on Figure 5-8. Groundwater contour maps showing the capture boundary in the three impacted hydrogeologic units are shown on Figures 5-9, 5-10, and 5-11. Plume maps for Upper Unit 3, Lower Unit 3, and Upper Unit 4 are shown on Figures 5-12, 5-13, and 5-14. Comparison of capture boundaries with the plume maps clearly shows that the TGRS achieves containment at the TCAAP boundary. With regard to groundwater extraction rates, the TGRS was operated in FY 2003 consistent with the requirements of the OU2 ROD. The TGRS Operating Strategy was completed in June 2003, and provided the following base pumping rates to ensure acceptable hydraulic containment:

Estimated Base Containment Rate:	1,200 gpm
Immediate Response Minimum (25% Safety Factor):	1,500 gpm
Operational Minimum (50% Safety Factor):	1,800 gpm

During FY 2003, the average flow rate for the extraction wells was approximately 1,696 gpm (Table 5-9). When corrected for downtime, the system averaged approximately 1,804 gpm. The main reason for the lower pumping rate was due to the performance of well B13, which operated about 100 gpm less than what was initially predicted. As such, the Army submitted an evaluation of potential remedial response actions to the USEPA and MPCA in September 2003. The evaluation document was under review at the end of FY 2003, and is anticipated to result in a revision to the Operating Strategy in early 2004.

The TGRS removed 3,041 pounds of VOCs in FY 2003, reaching a cumulative total of 185,977 pounds. Annual mass removal totals are shown in Table 5-10, with a well-by-well breakdown for FY 2003. Seven wells (B1, B4, B5, B6, B9, SC1 and SC5) that are located in the centers of the plume, achieve the largest rates of VOC removal. Together, these seven wells accounted for over 97 percent of the VOC mass removed. Wells B7, B10 and B11, which are located on the south and north edges of the plume, removed only about 0.1 percent (1.9 pounds) of the total VOC mass. The source control wells (together) accounted for 55 percent of the VOC mass removed, while accounting for only 9 percent of the water pumped by the system. SC5, in particular, removed 50 percent of the total VOC mass at a rate of only approximately 105 gpm (6 percent of the total water pumped by the system). This illustrates the efficiency of extracting groundwater from near the source areas. Annual mass removal has been on a declining trend since the maximum of 26,760 pounds in 1991.

Groundwater treatment is accomplished through treatment in four air strippers, followed by discharge to a former gravel pit (remedy components #2 and #3). Treatment has been very effective as shown on the influent/effluent trichloroethene trend graphs (Figure 5-15). This figure also shows that trichloroethene in the influent is slowly declining (1,500 to 2,000  $\mu\text{g/l}$  during the early operational period (late 1980's) to about 300  $\mu\text{g/l}$  in FY 2003). The gravel pit continues to be an effective means of treated water disposal.

Although the SWCA does not currently cover the TCAAP facility, the Army has controlled drilling of wells on the plant (if property is transferred outside of federal-control, the SWCA will be expanded to encompass such property). The Alternate Water Supply and Well Abandonment Program is underway, which also covers the TCAAP facility itself. This program continues to meet the intent of remedy component #4.

Reviews of new technologies (remedy component #5) are discussed at TRC meetings and are presented in the Annual Performance Report, as applicable. In September 2002, the MPCA and USEPA announced they would be conducting a natural attenuation microcosm study using a  $^{14}\text{C}$ -dichloroethylene tracer to determine the fate of this chemical in the groundwater. In

October 2002, the Army drilled a boring at Site G to collect soil for the study. The study results were published in early FY 2004. The MPCA has continued to monitor the results of a vegetable oil injection pilot study at the Navy site in Fridley, Minnesota. As of the end of FY 2003, the Army has not identified any new or emerging technologies that have the potential to cost-effectively accelerate the timeframe for aquifer restoration.

Groundwater monitoring (remedy component #6) continues to be conducted to track remedy performance. Monitoring has shown that along the TCAAP boundary, the plume width (as defined by exceedance of the trichloroethene cleanup level of 5  $\mu\text{g/l}$ ) has been shrinking since 1993. Extraction wells B-7, B-10, and B-12 have been shutdown in response to this shrinking plume width. The large majority of trichloroethene trend graphs reflect downward trends in concentration, indicating an overall improvement in water quality both up gradient and down gradient of the TGRS. Some exception have been noted, but are likely due to the complexity of the flow system, changes in flow direction over time, and the variation in chemical transport properties across the area.

### **5.3.5 Site Inspection**

A site inspection was conducted on March 2, 2004, by the Army, Alliant, National Guard, USEPA, MPCA, RAB, and other parties as shown on the list of attendees in Appendix A.1. Site inspection checklists for OU2 sites were completed and are included as Appendices A.3 through A.8.

#### **Shallow Soil Sites**

The inspection included Sites A, C, E, 129-3, and 129-15. Sites H and 129-5 were not readily accessible due to snow-covered roads. A photograph of one of the caution signs that was installed in early FY 2004 around protective soil cover perimeters (to warn against digging or disturbing the soil) is included in Appendix C. A photograph of Site C, which is in progress, is also included in Appendix C.

### Deep Soil Sites (D and G)

No concerns were noted at Site D. The modified side slopes at Site G (construction was completed in early FY 2004) did not appear to have any erosion. A photograph of the side slope improvement is included in Appendix C.

### Site A Shallow Groundwater

The Site A control building and extraction well locations were observed during the site visit. Locations of prior soil removal work were discussed.

### Site I Shallow Groundwater

Since no remediation system has been constructed, this site was not visited. Site I was discussed when the group stopped at Site K.

### Site K Shallow Groundwater

The existing treatment building at Site K and the approximate location of the groundwater extraction trench were observed. The improved operation of the new air stripper was discussed (much less maintenance is required). A photograph of the treatment system is included in Appendix C.

### Deep Groundwater

The treatment plant was inspected. The control panel, transfer pumps, air stripping towers, and associated blowers were observed. One of the pumphouses was inspected (SC5). A photograph of the treatment system is included in Appendix C.

No significant problems or issues were identified as a result of any of the site inspections.



### **5.3.6 Interviews**

Other than the individuals that were present at the site inspections to answer questions and guide the inspection (as named in the site inspection checklists), no interviews were conducted. Discussions with these individuals did not reveal any significant problems or issues.

## **5.4 TECHNICAL ASSESSMENT**

### **5.4.1 *Question A: Is the Remedy functioning as intended by the decision documents?***

The review of remedial action objectives, documents, and monitoring data suggest that the OU2 remedies are functioning as intended by the ROD, with the exception of Site I, as discussed below.

#### Shallow Soil Sites

For the shallow soil sites, the remedy that has been selected is intended to remove soils that are contaminated above the cleanup goals specified in the OU2 ROD. The soil excavation, treatment, and off-site disposal remedy has effectively accomplished this objective. Remediation has been completed at Sites A, E, H, 129-3, and 129-5. Due to the discovery of debris with ACM, construction of protective soil covers was necessary over portions of the dumps at Sites E and H as a means of preventing access to the ACM. The protective soil covers, in conjunction with land use controls, effectively accomplish this added objective. Remediation at Site C has been partially completed; however, options for completing soil remediation at this site were under discussion at the end of FY 2003.

For Dump Site 129-15, following site characterization, the selected remedy was to construct a protective soil cover over the site as a means of preventing access to the contaminants. The protective soil cover, in conjunction with land use controls, effectively accomplishes this objective.

O&M procedures include maintaining the cautionary signs around the perimeter of each protective soil cover (the signs were installed in early FY 2004). These signs will help ensure the short- and long-term protectiveness of the remedy by helping to prevent disturbance of protective soil covers. O&M would also include repair of any damage that compromises the thickness requirements for the protective soil covers; however, no such damage occurred during the period of this Five-Year Review.

The following LUCs have been selected for shallow soil sites, as established in the LUCIP:

- 1) Prohibit activities that would exceed the exposure scenario under which the site was cleaned up (an “industrial use scenario” was utilized). For Site C only, since soil remediation is not yet complete, prohibit activities other than those required for ongoing remedial actions.
- 2) Prohibit activities that would disturb protective soil covers at Sites E, H, and 129-15.

On July 30, 2003, the Army, the National Guard, and TWISS conducted the annual inspection of TCAAP sites for LUCs, as specified in the LUCIP. The checklist that was completed during the inspection is included as Appendix D. Other than completing cover construction at Site C, the only item requiring additional action was that caution signs marking the edges of protective soil covers had not yet been installed (the signs were installed in early FY 2004). The LUCs appear to be adequate for these sites, as the property currently exists (under federal control; see Section 5.5 for discussion of future issues related to LUCs, including potential land transfer).

#### Deep Soil Sites (D and G)

The SVE systems at Sites D & G were installed to remove VOCs from soil in the unsaturated zone. The systems were very effective, removing over 220,000 pounds of VOCs from startup in 1986 through shutdown in FY 1998. The SVE systems reduced the VOC concentrations in both shallow and deep soils at both sites to below cleanup levels. Having completed their objective, the SVE systems have been dismantled.

For the Site D shallow soils, the remedy that has been selected is intended to remove soils that are contaminated above the cleanup goals. The soil excavation, treatment, and off-site disposal remedy has effectively accomplished this objective, with remediation now complete at Site D.

The protective soil cover at Site D is intended to prevent access to PCBs that were secured in-place. The protective soil cover, in conjunction with land use controls, effectively accomplishes this objective. The protective soil cover at Site G is intended to prevent access to dump materials and also reduces infiltration of precipitation, minimizing leaching of any remaining VOCs. The protective soil cover, in conjunction with land use controls, effectively accomplishes this objective.

O&M procedures are limited to two items. The first is maintaining the cautionary signs around the perimeter of each protective soil cover (the signs were installed in early FY 2004). These signs will help ensure the short- and long-term protectiveness of the remedy by helping to prevent disturbance of protective soil covers. The second item is to annually remove any woody vegetation (greater than 2-inch diameter) to prevent deep rooting into the Site G cover. This O&M procedure helps maintain the integrity of the cover, thereby minimizing infiltration of precipitation and helping to ensure the short- and long-term protectiveness of the remedy. O&M would also include repair of any damage that compromises the thickness requirements for the protective soil covers; however, no such damage occurred during the period of this Five-Year Review.

The following LUCs have been selected for Sites D and G, as established in the LUCIP:

- 1) Prohibit activities that would exceed the exposure scenario under which the site was cleaned up (an "industrial use scenario" was utilized).
- 2) Prohibit activities that would disturb protective soil covers.

The annual inspection for LUCs (Appendix D) revealed that, other than completing cover construction at Site G, the only item requiring additional action was that caution signs marking the edges of protective soil covers had not yet been installed (the signs were installed in early FY 2004). The LUCs appear to be adequate for these sites, as the property currently exists (under federal control; see Section 5.5 for discussion of future issues related to LUCs, including potential land transfer).

#### Site A Shallow Groundwater

Evaluation of pumping rates and water quality trends support the interpretation that the extraction system is effectively containing the contamination. Decreasing contaminant concentrations suggest that aquifer restoration is occurring. The MDH SWCA and alternate water supply program continue to function as intended.

The O&M procedures remain adequate, given that the extraction system is effectively containing contamination and that the MCES discharge limits continue to be met. No changes to O&M procedures appear to be necessary. There have not been frequent equipment breakdowns, significant periods of unanticipated downtime, or O&M cost issues that would suggest any potential remedy problems.

The following LUCs have been selected for this site, as established in the LUCIP:

- 1) Prohibit unauthorized well construction and/or extraction of contaminated groundwater.
- 2) Prohibit activities that would disturb operation of the groundwater extraction/treatment system.
- 3) Implement the TCAAP Alternate Water Supply and Well Abandonment Program.
- 4) Maintain the MDH SWCA.

The annual inspection for LUCs (Appendix D) did not reveal any items that required additional action. The LUCs appear to be adequate for this site, as the property currently exists (under federal control; see Section 5.5 for discussion of future issues related to LUCs, including potential land transfer).

#### Site I Shallow Groundwater

The remedy is not functioning as intended because pilot testing of a dual-phase extraction system determined that the technology was not feasible due to low permeability of the soils (a conclusion agreed to by USEPA and MPCA). An amendment to the OU2 ROD will be implemented to change the preferred remedy from groundwater pump and treat to a groundwater monitoring based remedy, which will still be protective. The monitoring-based remedy is appropriate since the Unit 1 plume is not migrating offsite; rather, the Unit 1 contaminants leak downward into Unit 3, where they are hydraulically contained by the TGRS.

The following LUCs have been selected for this site, as established in the LUCIP:

- 1) Prohibit activities that would disturb the Building 502 floor slab.
- 2) Prohibit unauthorized well construction and/or extraction of contaminated groundwater.

The annual inspection for LUCs (Appendix D) did not reveal any items that required additional action. The LUCs appear to be adequate for this site, as the property currently exists (under federal control; see Section 5.5 for discussion of future issues related to LUCs, including potential land transfer).

#### Site K Shallow Groundwater

Evaluation of groundwater elevation contours and water quality trends support the interpretation that the extraction system is effectively containing the contamination. Decreasing water quality trends suggest that aquifer restoration is occurring.

The O&M procedures remain adequate, given that the extraction system is effectively containing contamination and that the surface water discharge limits continue to be met. No changes to O&M procedures appear to be necessary. There have not been frequent equipment breakdowns, significant periods of unanticipated downtime, or O&M cost issues that would suggest any potential remedy problems.

The following LUCs have been selected for this site, as established in the LUCIP:

- 1) Prohibit activities that would disturb the Building 103 floor slab.
- 2) Prohibit unauthorized well construction and/or extraction of contaminated groundwater.
- 3) Prohibit activities that would disturb operation of the groundwater extraction/treatment system.

The annual inspection for LUCs (Appendix D) did not reveal any items that required additional action. The LUCs appear to be adequate for this site, as the property currently exists (under federal control; see Section 5.5 for discussion of future issues related to LUCs, including potential land transfer).

#### Deep Groundwater

Evaluation of groundwater elevation contours, pumping rates, and water quality trends support the interpretation that the TGRS achieves containment at the TCAAP boundary. TGRS operation has continued to narrow the width of the plume at the TCAAP boundary, allowing some extraction wells to be shut off. Decreasing contaminant concentrations suggest that aquifer restoration is occurring. The treatment system continues to reliably treat recovered groundwater to meet the discharge requirements for discharge to the gravel pit.

The O&M procedures remain adequate, given that the extraction system is effectively containing the contamination and that the treatment system reliably treats recovered groundwater to meet discharge requirements. No changes to O&M procedures appear to be necessary. There have not been frequent equipment breakdowns, significant periods of unanticipated downtime, or O&M cost issues that would suggest any potential remedy problems. The flow rate from B13, the new extraction well, has been about 100 gpm less than anticipated, and an evaluation of potential remedial response actions was under review at the end of FY 2003.

The following LUCs have been selected for this site, as established in the LUCIP:

- 1) Prohibit unauthorized well construction and/or extraction of contaminated groundwater.
- 2) Prohibit activities that would disturb operation of the groundwater extraction/treatment system.

The annual inspection for LUCs (Appendix D) did not reveal any items that required additional action. The LUCs appear to be adequate for this site, as the property currently exists (under federal control; see Section 5.5 for discussion of future issues related to LUCs, including potential land transfer).

**5.4.2      *Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?***

The remedial action objectives for OU2 sites remain valid, subject to previously-discussed ROD amendments for Site C shallow soils, Site D shallow soils (non-VOC contaminants), Site G (dump), Site I shallow groundwater, and Site 129-15 (dump). No other changes to the remedy components of OU2 sites are necessary.

A human health risk assessment for TCAAP was performed by the USEPA in 1991, prior to cleanup of source areas. The risk assessment evaluated the potential health risks associated with exposure to the source areas on TCAAP as well as the contaminated groundwater both on and off the original TCAAP. The risk assessment involved calculating the potential increase in the risk of cancer and the potential risk of non-cancer effects, such as liver damage and reproductive abnormalities. It also evaluated the ways by which people could be exposed to the contaminants. The risk assessment performed by the USEPA was updated in the OU2 Feasibility Study to accommodate the additional COCs identified during various site investigations that were conducted subsequent to the USEPA's risk assessment. Since ARARs existed for all of the OU2 groundwater COCs, health risk-based remediation goals were not developed for this medium. For OU2 soils, site-specific, health risk-based remediation goals were developed. The exposure assessment equations, contaminant toxicity equations, and quantitative site-specific risk evaluations were documented in Appendix C of the OU2 ROD (methodology was based on the 1989 USEPA Risk Assessment Guidance for Superfund).

The cleanup levels for COCs for OU2 soil and groundwater sites are listed in Table 3-1. Most of the OU2 cleanup levels were established in Table 1 of the OU2 ROD; however, a few of these cleanup levels were subsequently modified and a few were established subsequent to the signing of the OU2 ROD (as discussed in this section). The validity of the original exposure assumptions, toxicity data, and cleanup levels is discussed below, first for OU2 groundwater and then for OU2 soils.

#### OU2 Groundwater

The potential receptors and exposure routes, as stated in the OU2 ROD, were as follows:

*People who might be at risk from exposure to contaminated groundwater include TCAAP workers and local residents who rely on private drinking wells that extract contaminated groundwater. The potential pathways by which these receptors might be exposed include ingestion, inhalation during showering, and adsorption through the skin (dermal contact) during showering or bathing with contaminated groundwater.*



The potential receptors and routes of exposure remain valid. No new exposure routes are applicable. No changes in land use have occurred that would have a bearing on the remedy. No new groundwater COCs have been added to any of the groundwater sites and no cleanup levels for COCs have been modified since the OU2 ROD was signed.

The cleanup levels for OU2 groundwater sites that are listed Table 3-1 were based on consideration of the following ARARs, as identified in Table 3 of the OU2 ROD:

- Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs) specified in the National Primary Drinking Water Regulations (40 CFR Part 141), which apply to public water supplies, and which were established by the USEPA in accordance with the Safe Drinking Water Act (SDWA).
- Maximum Contaminant Levels (MCLs) for the State of Minnesota, as specified in the Minnesota Rules (Chapter 4720), which apply to public water supplies. (Note that the State of Minnesota adopted the Federal MCLs, and therefore an added consideration of State of Minnesota MCLs has the same impact on potential cleanup levels as the Federal MCLs.)
- Health Risk Limits (HRLs) specified in Minnesota Rules (4717.7100 to 4717.7800), which can be applied to private water supplies, and which were established by the MDH in accordance with Minnesota's Groundwater Protection Act of 1989.

The Health Advisory values established by the USEPA Office of Water were identified as guidance that was To Be Considered (TBC) for development of groundwater cleanup levels. The cleanup levels developed in the OU2 ROD (Table 1 thereof) utilized the lowest value among the Federal MCL, Federal non-zero MCLG, Minnesota MCL, and HRL for deep groundwater, and used the HRL for shallow groundwater sites. For all OU2 groundwater COCs, the review of current regulations revealed that there have been no changes in the Federal MCL, Federal MCLGs, or HRLs, indicating that no changes to the cleanup levels need to be considered for any

of the shallow or deep groundwater sites. With regard to the USEPA Health Advisory levels identified as TBC, Tables 3 and 4 of the OU2 ROD indicated that only four of the COCs had values established. Review of the current Health Advisory levels for these four COCs indicated that they have not changed. Health Advisory levels have now been established for all of the other COCs; however, all of these values equal or exceed the cleanup levels, and therefore do not need to be further considered.

Based on the above review, no changes to any of the cleanup levels for OU2 groundwater need to be considered at this time; see discussion in Section 5.5 regarding potential future changes in HRLs.

#### OU2 Soils

The current land use for the federally controlled portion of TCAAP, which is the area that contains all of the contaminant source areas with LUCs, is a military facility. The risk evaluation developed for TCAAP (in the OU2 ROD) assumed a continued, “industrial use scenario”. The following assumptions were made relative to potential receptors and exposure routes, as stated in the OU2 ROD:

*People who might be at risk from exposure to contaminated soil include TCAAP workers or occupants. Incidental ingestion and dermal contact are the only significant routes for receptors to be exposed to contaminants in surface soils at the site. If future activities require excavation, however, workers may be exposed to contaminants by inhalation, as well as through incidental ingestion and dermal contact.*

When considering exposure routes at sites where the cleanup levels were health risk-based values, the OU2 ROD noted that contaminated soils existing at depths greater than 12 feet did not require excavation/remediation, since soils below that depth are not considered accessible.

The risk assessment evaluated both cancer and non-cancer effects. The cancer risk evaluation was based on the exposure assumption that an individual would be exposed to contaminated soils

via dermal contact and ingestion over an exposure period equal to 25 years. The calculation of soil cleanup levels under the industrial scenario was based on an adult receptor (body weight of 70 kg), with a soil ingestion rate of 50 mg/day and a dermal exposure on 0.31 m<sup>2</sup> of body surface, both occurring 250 days out of each year. A chemical was identified as a COC when the increased cancer risk reached one in one million. For non-cancer risk, a chemical was identified as a COC when the Hazard Index was greater than one.

For Site 129-15, a special industrial exposure scenario was utilized. The special exposure scenario was a one-time commercial, industrial or utility construction event where excavation exposes subsurface soils for a limited time. This exposure scenario assumed that excavated soils are managed to eliminate or greatly reduce exposure to fugitive dusts. The assumed exposure was one 40-day exposure (i.e., a two-month construction period) per year, for two years. This exposure represents the expected time that construction workers would be exposed to contaminated soils as a result of excavating soil for such construction projects as laying foundations and installing utility lines. The calculation of soil cleanup levels utilized the same adult receptor body weight, soil ingestion rate, and dermal exposure surface area as described above for other sites.

The potential receptors and routes of exposure remain valid. No new exposure routes are applicable. No changes in land use have occurred that would have a bearing on the remedy (see Section 5.5 for discussion of issues related to potential future property transfers).

In addition to consideration of health risk-based remediation goals, cleanup levels were selected based on consideration of background soil concentrations, ARARs (if available), and soil leaching-based goals. Leaching based-goals were calculated by the MPCA using a soil model, as documented in Appendix C of the OU2 ROD, for those constituents for which evidence of soil leaching existed (specifically, if a constituent existed in groundwater above drinking water or health-based standards). Cleanup levels were selected using the following hierarchy of precedence:

- 1) The background level takes precedence as the minimum remediation goal.
- 2) ARARs take precedence over the remaining criteria.
- 3) The more stringent of health risk-based or leaching-based goals takes precedence.

For health risk-based goals, the lower of the cancer and non-cancer values were used (including adjustment for multiple contaminants, where necessary). The methodology for selection of cleanup levels is documented in the OU2 ROD.

Although most of the cleanup levels shown in Table 3-1 are identical to those developed in the OU2 ROD, a few changes occurred in the final COC lists and in the cleanup level numbers. Based on additional site investigation work conducted subsequent to the OU2 ROD, COCs were added at Site A (tetrachloroethene and trichloroethene), Site D (antimony, lead, and nitroglycerine), and 129-15 (lead). PCBs were not listed as a COC at Site D in the OU2 ROD; however, PCBs that were “secured in-place” (as discussed previously) are known to exist at concentrations that exceed the ARAR of 10 mg/kg that was cited in the OU2 ROD, which led to the Army’s designation of a protective soil cover over the area of PCB-contaminated soils at Site D. Nitroglycerine was listed as a COC for Site 129-3 in the OU2 ROD; however, no cleanup level was established. This cleanup level was calculated at the time of soil remediation work at Site 129-3. The background number for arsenic in TCAAP soils was raised from 4 to 10 mg/kg, as documented in a June 14, 1999 MPCA letter to the Army, and this resulted in the cleanup levels at Sites C, H, and 129-15 being raised to 10 mg/kg. However, at Site 129-15, the highest arsenic concentration detected in soils was 5 mg/kg, and therefore arsenic was dropped as a COC. Lastly, the Site G cleanup level for trichloroethene was raised to 36.1 mg/kg, which was based on a revised soil leaching analysis that specifically accounted for the lower permeability of the Site G cover (regulatory consistency for this change was provided July 24, 2002). For cleanup levels that were established subsequent to the OU2 ROD, the health risk calculations were noted to be based on the same methodology and input parameters that were documented in Appendix C of the OU2 ROD.

To verify the protectiveness of the remedy, three areas were reviewed: ARARs were checked; the toxicity values used in risk assessment calculations were checked for any changes; and, for any cleanup levels that were soil leaching-based, the drinking water or health-based standard that was utilized in the leaching number development was checked for any changes.

Lead and PCBs were the only COCs for which health-based guidance could be utilized to establish TBC values. The lead cleanup level of 1200 mg/kg (industrial scenario) was calculated by the USEPA using the Exposure Model for Assessing Risks Associated With Adult Exposure to Lead in Soil, as documented in Appendix C of the OU2 ROD. This model is still in use and appears to remain a valid approach. The blood lead target value for a developing fetus remains at 10 micrograms/deciliter of blood, as set by the Center for Disease Control and Prevention. This value is also quoted in the Agency for Toxic Substances and Disease Registry's update of the lead profile, dated July 1999. For PCBs, since there is a protective soil cover being maintained at Site D where PCB-contaminated soils were "secured in-place" (i.e., soils are known to contain PCBs at concentrations higher than the cleanup level of 10 mg/kg), the PCB guidance that was used to establish the TBC value was not reviewed.

The only COCs for which the cleanup levels were soil leaching-based were trichloroethene (Sites A, D, G and 129-3) and tetrachloroethene (Site A). The MPCA soil model utilized the trichloroethene MCL of 5 ug/l for sites with Unit 3/4 groundwater (Sites D, G, and 129-3) and used the trichloroethene and tetrachloroethene HRLs of 30 and 7 ug/l for Site A (Unit 1 groundwater). Since the lowest value among the Federal MCL, non-zero MCLG, Minnesota MCL, and HRL continues to be 5 ug/l, no changes to the trichloroethene cleanup levels for Sites D, G and 129-3 need to be considered. Since the HRLs have not changed, no changes to the trichloroethene or tetrachloroethene cleanup levels for Site A need to be considered.

Lastly, the toxicity values used in risk assessment calculations were checked. To perform this check, the current toxicity data was obtained from the Integrated Information System Database (IRIS). IRIS is updated monthly and the check was performed in March 2004. The Health

Effects Assessments Summary Tables (HEAST) have not been updated since 1997 and were not reviewed, given the outdated nature.

For Sites A, C, D, E, G, H, 129-3, 129-5, and 129-15, toxicity data that was used to calculate health-risk based goals is presented in Tables I-1 and I-3 through I-10 in Appendix C of the OU2 ROD. The oral reference dose (RfDo) and/or oral slope factors (Sfo) listed in these tables were checked against IRIS. The following changes in values were found:

- 1) **Site C:** Beryllium: the oral reference dose (RfDo) was found to be 2E-03, versus the value in the OU2 ROD of 5E-03. Recalculation of the non-cancer PRG results in lowering the PRG from 180 to 72 mg/kg. However, since the beryllium cleanup level is 0.7 mg/kg, no change to the beryllium cleanup level needs to be considered.
- 2) **Site C:** Thallium: several oral reference doses (RfDo) are listed in IRIS for the different salts of thallium, ranging from 8E-05 to 9E-05, versus the value in the OU2 ROD of 7E-05. Given that these reference dose values are higher, the calculated non-cancer PRG would also increase, and thus no change to the thallium cleanup level needs to be considered.

Based on the above review, there are no changes to cleanup levels that need to be considered.

**5.4.3      *Question C: Has any other information come to light that could call into question the protectiveness of the remedy?***

No information has been obtained that could call into question the protectiveness of the remedy for the current land use. See Section 5.5 for discussion of issues related to potential future property transfers.

#### **5.4.4 Technical Assessment Summary**

Based on the remedial action objectives, data reviewed, and the site inspection, the remedies are functioning as intended by the OU2 ROD. O&M information and costs do not suggest any potential remedy problems. No changes in land use or exposure scenarios have occurred that would affect the protectiveness of the remedy (see Section 5.5 for discussion of issues related to potential future property transfers). There have been no changes to the ARARs used in establishing groundwater cleanup levels (a few more TBC values were established but did not warrant further consideration). There were only two changes in toxicity values that were used in determining health risk-based cleanup levels; however, neither of these changes suggested that changes to the cleanup levels should be considered. There have been no changes to any of the groundwater ARARs that were utilized to develop soil cleanup levels that were based on leaching. No information has been obtained that could call into question the protectiveness of the remedy.

#### **5.5 ISSUES**

As described in Section 3.2, the federal government is planning to transfer approximately 774-acres of TCAAP. Up to this point in Section 5 of this report, statements have been made that the remedies are functioning and remain protective under the current land use. While true, future use of the property could be a significant issue, and appropriate steps need to be taken to ensure that protectiveness is maintained. Army is not proposing a change in land use, and it is expected that the transfer documents will discuss the condition of the property at the time of transfer and the use assumptions. While the future property use is not known at this time, it will potentially be a mixture of recreational, residential, commercial, and industrial uses. It is anticipated that there will be deed-based restrictions implemented at the time of transfer. Because OU2 soil has been remediated to cleanup levels based on site-specific exposure assumptions (commonly considered "industrial use"), if the future land use should change, the cleanup levels and associated risks should be reevaluated. Additional remediation and/or changes in land use

controls may be appropriate. These measures are expected to remain protective of human health even after the time of transfer. Future five-year reviews will serve to ensure that land use controls remain effective, assuming there is a change in land use.

The paragraph above points out the importance of land use controls (LUCs), with or without transfer of property. It is important that the Army, MPCA, and USEPA agree on the types of LUCs, timing for implementation, and regulatory agency enforceability. There was a federal-level debate of these issues between the Department of Defense and USEPA, but as of October 2003, there was agreement on LUC Principles set forth by the Navy. The Army has endorsed the Navy/USEPA Principles and intends to implement LUC measures in a manner consistent with these Principles. This includes submittal of the LUCIP, or an alternate document more consistent with the Principles, for regulatory review and approval. This milestone will enable the TCAAP parties to move forward with resolution of site-specific LUCs, and make refinements, if necessary, to the LUCs that the Army has already implemented (note that this is not a protectiveness concern since LUCs have already been implemented). Various amendments to the OU2 ROD have been mentioned in this report, and it is important that these amendments document the LUCs as a component of the remedies. Resolution of LUC issues will also allow final regulatory approval for various closeout reports.

On November 29, 2002, EPA published draft guidance for evaluating the vapor intrusion to indoor air pathway from contaminated groundwater and soils. Given TCAAP's current status as an occupational setting, this guidance does not apply. However, should the land use change in the future, it would be appropriate to evaluate if the vapor intrusion exposure pathway is complete, and if so, whether it poses an unacceptable risk to human health.

On January 7, 2002, the MDH issued an interim exposure limit for trichloroethene of 5 ug/l (see section 4.5 for further discussion). If the HRL is ultimately revised and is lower than 30 ug/l, the potential effects on the shallow groundwater cleanup levels (all are 30 ug/l) would need to be considered. There is no immediate impact from the interim exposure limit since the shallow groundwater trichloroethene plumes are contained on TCAAP and there are no receptors. If the



HRL is ultimately revised and is 5 ug/l or higher, the new HRL would have no bearing on the deep groundwater cleanup level of 5 ug/l. If the HRL is ultimately revised and is lower than 5 ug/l, the potential effects on the deep groundwater cleanup level would need to be considered. The MDH is in the process of reviewing and revising the HRLs for a number of chemicals, not just trichloroethene. Revised HRLs need to be promulgated through rulemaking, and it is anticipated that this process will be culminated in 1-2 years. Revisions to the HRLs may have an impact on the groundwater cleanup levels for TCAAP.

For Site C, options for completing shallow soil remediation were under discussion at the end of FY 2003 (as previously discussed).

ROD amendments need to be executed for Sites C, D, G, I, and 129-15 (as previously discussed).

For deep groundwater, the flow rate of B13, which was about 100 gpm less than what was initially predicted, needs to be addressed (as previously discussed).

## **5.6 RECOMMENDATIONS AND FOLLOW-UP ACTIONS**

The following recommendations are made:

- 1) Shallow Soils: For Site C, select a revised remedy for shallow soils and implement it. Prepare ROD amendments for remedy selections at Sites C and 129-15.
- 2) Deep Soil Sites (D and G): Prepare ROD amendments for remedy selections at Site D (non-VOC shallow soils) and Site G. Since actions taken to remediate PCB-contaminated soil at Site D were not part of the OU2 ROD, future five-year reviews should consider whether the land use controls remain effective for the PCBs left in-place.

- 3) Site A Shallow Groundwater: Monitor the MDH HRL revision process and assess if there are any impacts on the cleanup levels, especially for trichloroethene in light of USEPA's potential update of the trichloroethene health risk assessment.
- 4) Site I Shallow Groundwater: Prepare a ROD amendment for the change from pump and treat to a monitoring-based remedy. Monitor the MDH HRL revision process and assess if there are any impacts on the cleanup levels, especially for trichloroethene in light of USEPA's potential update of the trichloroethene health risk assessment.
- 5) Site K Shallow Groundwater: Monitor the MDH HRL revision process and assess if there are any impacts on the cleanup levels, especially for trichloroethene in light of USEPA's potential update of the trichloroethene health risk assessment.
- 6) Deep Groundwater: Determine what change(s) to the TGRS Operating Strategy are needed due to the lower than anticipated flow rate from well B13. Monitor the MDH HRL revision process and assess if there are any impacts on the cleanup levels, especially for trichloroethene since the MCL or HRL may change due to the USEPA's potential update of the trichloroethene health risk assessment.

Relative to all of these sites, the Army, USEPA, and MPCA need to work towards resolution of issues regarding LUCs, as discussed in Section 5.5. Also, as the process of TCAAP property transfer moves forward, potential changes to LUCs and LUC implementation responsibilities will need to be resolved by the Army, USEPA, and MPCA, so that the protectiveness of the remedies is maintained. Because OU2 soil has been remediated to cleanup levels based on site-specific exposure assumptions (commonly considered "industrial use"), if the future land use should change, the cleanup levels and associated risks should be reevaluated. If property is transferred out of federal control, the Minnesota Department of Health should expand its Special Well Construction Area to encompass these parcels. Furthermore, evaluation of the potential for a vapor intrusion pathway should be considered as part of any future land transfer and/or change in land use.

## 5.7 PROTECTIVENESS STATEMENT

The components of the OU2 remedy remain protective of human health and the environment.

For soil sites where the remedy has been completed (Sites A, D, E, H, 129-3, 129-5, 129-15), the site's availability for industrial use has been restored. Review of the toxicity data upon which the health risk assessments for these sites were based showed that no changes have occurred that could potentially affect the protectiveness of the remedies. The protective soil covers at Sites E, H, 129-15, D, and G (Site G was completed in early FY 2004), in conjunction with land use controls, effectively prevent exposure to contaminated soils/debris.

The groundwater containment systems are meeting their containment objectives and the treatment systems are meeting their discharge requirements. For Site A shallow groundwater, the alternate water supply and well abandonment program, along with the SWCA, are mitigating potential risks associated with private wells. Water quality trends suggest that progress towards aquifer restoration continues to occur at Site A, Site K, and in the deep groundwater. Review of the ARARs upon which the groundwater cleanup levels were based showed that no changes to the cleanup levels are needed.

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## **6.0 Operable Unit 3 (OU3)**

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### **6.1 REMEDIAL ACTIONS**

#### **6.1.1 Remedy Selection**

The OU3 ROD, signed September 1992, prescribes the following components for the selected remedy:

- Extraction of groundwater at the leading edge of the south plume.
- Treatment of extracted groundwater for the removal of VOCs by a pressurized GAC system.
- Discharge of treated groundwater to the potable water supply of the City of New Brighton.
- Monitoring of the groundwater to verify the effectiveness of the remedy.

The ROD addressed the Remedial Action Objectives, which were previously developed as part of the OU3 Feasibility Study (July 1992), as follows:

- Restore the contaminated aquifer for future use by reducing contaminant levels to those which will adequately protect human health and the environment;
- Control contaminant migration to prevent further spread of VOC plumes;
- Prevent the near term and future exposure of human receptors to contaminated groundwater above MCLs both on and off Site;
- Monitor groundwater in a manner to verify effectiveness of remedial measures.

### 6.1.2 Remedy Implementation

The Plume Groundwater Recovery System (PGRS) consists of New Brighton Municipal Well #13 (NBM #13) and a GAC treatment plant. The PGRS began operation on May 3, 1994, and treated water was used as part of the municipal water supply. In 1997, the PGRS influent dropped to below the ROD-required limits for all VOCs. In August 2001, based on further reductions in plume size and concentration, the USEPA and MPCA approved an interim operational change to cease PGRS operation for remediation purposes, with an increase in groundwater monitoring. The City of New Brighton has continued to periodically use NBM #13 for peak demand water supply. For remediation purposes, the extraction well is being maintained in standby status until December 2004. At that time, the MPCA and USEPA will determine if the action can be considered final, and if so, then a ROD amendment will be proposed.

The extracted groundwater is used as part of the New Brighton water supply system, and as such, New Brighton took the lead on design and construction of the system, and is responsible for operation of the system. New Brighton contracted Barr Engineering to provide design and construction oversight services. Alliant is paying for the OU3 remedy.

Although not specifically required by the OU3 ROD, the MDH SWCA (issued in June 1996) encompasses the OU3 plume, and the Alternate Water Supply and Well Abandonment Program has been implemented and is an ongoing program maintained by the Army (refer to Section 4.1.2 for additional information).

Groundwater monitoring is conducted in accordance with plans that are reviewed and updated annually as part of the APR. Alliant conducts the sampling related to OU3 performance monitoring, and the Army conducts private well sampling related to the Alternate Water Supply and Well Abandonment Program. Barr Engineering, on behalf of the City of New Brighton, conducts the extraction well and treatment system effluent sampling (if operational).

### **6.1.3 System Operations/Operation and Maintenance (O&M)**

The City of New Brighton operates and maintains the OU3 treatment facility and associated extraction well and distribution system. The PGRS was in standby status at the end of FY 2003, and O&M procedures are limited to maintaining that condition.

Annual O&M costs were about \$200,000 per year from 1999 to 2001 (when the PGRS was operational), versus the original O&M cost estimate of \$276,000. With the PGRS in standby status, costs were about \$75,000 and \$30,000 in 2002 and 2003, respectively. Additional information on the O&M cost breakdown is attached to the OU3 site inspection checklist (Appendix A.9).

## **6.2 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW**

The prior Five-Year Review concluded that the components of the OU3 remedy remained protective of human health and the environment. Based on the fact that contaminant concentrations in the vicinity of NBM #13 had declined to below the cleanup levels, the report had recommended that the level of hydraulic containment be evaluated. This evaluation was eventually made and submitted to the USEPA and MPCA in October 2000 (Plume History Evaluation, Operable Unit 3). The evaluation report recommended shutting down the PGRS, which occurred in August 2001, as discussed above.

## **6.3 FIVE-YEAR REVIEW PROCESS**

### **6.3.1 Administrative Components**

Administrative components were as described for OU1 (see Section 4.3.1).

### **6.3.2 Community Notification and Involvement**

Community notification was conducted as described for OU1 (see Section 4.3.2).

### **6.3.3 Document Review**

The primary documents reviewed for OU3 were the following:

- Record of Decision - Groundwater Remediation, Operable Unit 3, September 1992
- TCAAP FY 2003 Annual Performance Report (APR), Draft, February 2004
- TCAAP Final APRs for Fiscal Years 1999, 2000, 2001, and 2002
- Plume History Evaluation, Operable Unit 3, October 2000
- Previous Five Year Review Report, September 1999

The OU3 ROD was the source of information for remedial action objectives and cleanup levels. The FY 2003 APR was the primary source for monitoring data and for determining the status at the end of this Five-Year Review period.

### **6.3.4 Data Review**

Status of the OU3 remedial action components is summarized in Table 1-1.

Groundwater extraction (remedy component #1) via pumping of well NBM #13 has been discontinued as an interim operational change for remediation (containment) purposes (see discussion in Section 6.1.2). The City of New Brighton operated the PGRS on an intermittent schedule from May through October 2003, solely to satisfy peak water supply demand requirements. The PGRS was then returned to standby status. This pumping was performed for municipal water supply purposes only, and not for remediation purposes. Throughout its periods of operation, the total VOC mass removed by the PGRS is 132 pounds.

Treatment of extracted groundwater in the PGRS treatment plant prior to discharge into the City of New Brighton municipal water distribution system (remedy component #2) continues to be very effective, as evidenced on Figure 6-1 and Table 6-1. The treatment system consists of three GAC vessels plumbed in parallel. Another three GAC vessels are plumbed in series with the first three to provide backup treatment. Sampling between carbon vessels is routinely conducted (in a similar manner to that described for the OU1 PGAC system) to determine when a carbon change-out is needed.

In accordance with remedy component #3, treated water is used by the City of New Brighton (and also the City of Fridley through the interconnection) for municipal water supply.

Groundwater monitoring, as required by remedy component #4, continues to be conducted to verify performance of the remedy. Each fiscal year, a revolving, five-year monitoring plan is prepared by the Army and submitted to the USEPA and MPCA for approval via the APR. Although it covers five years, it is submitted on an annual basis to allow for minor changes to be made which streamline or improve the quality of the monitoring data to be collected. In FY 2003, quarterly groundwater samples were collected from seven wells, including the extraction well, in the vicinity of the PGRS (south of Interstate 694). These wells provide a sentry monitoring network near the extraction well to monitor for any potential rebound in concentrations. Trichloroethene was detected in two of the seven sentinel wells at less than half the reporting limit of 1 ug/l. These concentrations are consistent with expected residual levels in this area. Within the OU3 plume, trichloroethene was the only contaminant that exceeded the cleanup level of 5 ug/l (four monitoring wells). The OU3 plume is shown on Figures 4-3, 4-4, and 4-5.

### **6.3.5 Site Inspection**

Given that the PGRS was not operational, the site inspection team elected not to visit this site. The site inspection checklist that was completed for OU3 is included as Appendix A.10.



### 6.3.6 Interviews

The information for the site inspection checklist was obtained through phone interviews and review of available documents. Discussions with these individuals did not reveal any significant problems or issues.

## 6.4 TECHNICAL ASSESSMENT

### 6.4.1 *Question A: Is the Remedy functioning as intended by the decision documents?*

The review of remedial action objectives, documents, and monitoring data suggest that the remedy is functioning as intended by the ROD. The plume does not extend beyond NBM #13, as intended by the remedy. Decreasing contaminant concentrations suggest that aquifer restoration is occurring (particularly the northward movement of the leading edge of the plume). The PGRS treatment system continues to reliably treat recovered groundwater to drinking water standards (when operational). The MDH SWCA and alternate water supply program continue to function as intended.

The O&M procedures remain adequate, given that the treatment system reliably treats recovered groundwater to drinking water standards (when operational). No changes to O&M procedures appear to be necessary, and are generally limited to maintaining the standby status.

### 6.4.2 *Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?*

The assumed route of exposure to contaminated groundwater remains valid (i.e., ingestion, inhalation during showering, and absorption through the skin during showering or bathing). No new exposure routes are applicable. No changes in land use have occurred that would have a

bearing on the remedy. No new contaminants or contaminant sources have been identified. The fact that no VOCs were detectable in NBM #13 in FY 2003 suggests that the likelihood of exposure via this municipal well is minimal (even if GAC treatment was not utilized).

The cleanup levels for OU3 are listed Table 3-1. These were based on consideration of the following Applicable or Relevant and Appropriate Requirements (ARARs), as identified in the OU3 ROD (page 26):

- Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs) specified in the National Primary Drinking Water Regulations (40 CFR Part 141), which apply to public water supplies, and which were established by the USEPA in accordance with the Safe Drinking Water Act (SDWA).
- Recommended Allowable Limits (RALs) for Drinking Water Contaminants, Release 3, January 1991, prepared by the MDH.

The MDH RALs are no longer in use and have been superseded by the MDH's establishment of HRLs (specified in Minnesota Rules 4717.7100 to 4717.7800), which can be applied to private water supplies. HRLs were not cited in the OU3 ROD as ARARs (the OU3 ROD was signed a year earlier than the OU1 ROD). State of Minnesota MCLs are another potential ARAR that was not identified in the OU3 ROD; however, the State of Minnesota adopted the Federal MCLs. Therefore, consideration of State of Minnesota MCLs would have no impact on potential cleanup levels. The cleanup levels developed in the OU3 ROD utilized the lowest value among the MCL, non-zero MCLG, and RAL. The review of the current regulations revealed that for all six OU3 COCs, there are MCLs, MCLGs, and HRLs that have been established. Using the current regulations, and applying the same basic methodology for identifying cleanup levels (i.e., using the lowest value among the MCL, non-zero MCLG, and HRL), yields the same cleanup levels that are listed in Table 3-1. No changes to the cleanup levels need to be considered, based on this review.

The remedial action objectives identified in the OU3 ROD remain valid. No new objectives are proposed.

**6.4.3      *Question C: Has any other information come to light that could call into question the protectiveness of the remedy?***

No information has been obtained that could call into question the protectiveness of the remedy.

**6.4.4      Technical Assessment Summary**

Based on the remedial action objectives, data reviewed, and the site inspection, the remedy is functioning as intended by the OU3 ROD. No changes in land use or exposure scenarios have occurred that would affect the protectiveness of the remedy. The ARARs used in establishing cleanup levels have undergone some changes (proposed values in regulations have become final, more MDH HRLs have been established, and MDH RALs are no longer applicable); however, none of these changes suggest that a change to the cleanup levels should be considered. No information has been obtained that could call into question the protectiveness of the remedy.

**6.5            ISSUES**

On November 29, 2002, USEPA published draft guidance for evaluating the vapor intrusion to indoor air pathway from contaminated soil and groundwater. With respect to OU3, there is contaminated groundwater below residential homes. Given the depth to the contaminated groundwater, and the presence of a clay till layer in between the contamination and the ground surface, the vapor pathway is not expected to represent a concern. Nonetheless, it would be appropriate to consider the draft guidance for OU3.

On January 7, 2002, the MDH issued an interim exposure limit for trichloroethene of 5 ug/l (see section 4.5 for further discussion). If the HRL is ultimately revised and is 5 ug/l or higher, the

new HRL would have no bearing on the OU3 cleanup level of 5 ug/l. If the HRL is ultimately revised and is lower than 5 ug/l (or if the MCL were to be lowered), the potential effects on the OU3 cleanup level would need to be considered. The MDH is in the process of reviewing and revising the HRLs for a number of chemicals, not just trichloroethene. Revised HRLs need to be promulgated through rulemaking, and it is anticipated that this process will be culminated in 1-2 years. Revisions to the HRLs may have an impact on the groundwater cleanup levels for other chemicals observed in OU3.

Once the standby period has expired for the PGRS, including NBM #13, it is anticipated that a ROD amendment will be executed to document that this remedy component is no longer required. Disposition of the PGRS and NBM #13 will need to be resolved between Alliant, City of New Brighton, the Army, and the Regulators.

## **6.6 RECOMMENDATIONS AND FOLLOW-UP ACTIONS**

Using USEPA guidance, the Army should evaluate the vapor intrusion to indoor air pathway to verify that there are no concerns for OU3.

The USEPA, MPCA, MDH, and Army should continue to monitor the USEPA's progress towards finalizing a health risk assessment for trichloroethene, and any effect that may have on the cleanup level. In addition, the MDH HRL revision process should be tracked to see if there would be any impact on cleanup levels for other chemicals.

A ROD amendment should be executed to document that operation of the PGRS is no longer required.

## 6.7 STATEMENT OF PROTECTIVENESS

The components of the OU3 remedy remain protective of human health and the environment. The alternate water supply and well abandonment program, along with the SWCA, are mitigating potential risks associated with private wells. The PGRS no longer needs to be operated for remediation (containment) purposes. When the city has electively operated the PGRS, the treatment system has reliably provided a safe municipal water supply. Water quality trends suggest that progress towards aquifer restoration continues to occur. Review of the ARARs upon which the groundwater cleanup levels were based showed that no changes to the cleanup levels are needed.

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## 7.0 Other Removal Actions

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In addition to the remedial actions prescribed in the OU2 ROD, other areas of TCAAP are being addressed through removal actions. USEPA policy is to include removal actions in five-year reviews if, after the site closeout report has been submitted, hazardous substances remain on-site at levels that do not allow for unlimited use and unrestricted exposure. The removal actions that were implemented at the Grenade Range and Outdoor Firing Range fit these criteria and will be discussed in this section.

Two other sites are being addressed as removal actions, the 135 and 535 Primer/Tracer Areas, but they do not fit the criteria for a five-year review. Both sites were in the process of being investigated/evaluated at the end of FY 2003 and decisions for remedial action and remedy selection have not yet been made (the trigger of submitting a closeout report has not yet been reached). A brief discussion of the status for these two sites was presented in Section 2.0.

### 7.1 REMOVAL ACTIONS

#### 7.1.1 Remedy Selection

The remedial action objectives for these two sites were the same as for other OU2 shallow soil sites (see Section 5.1.1). The selected remedy for these sites involved the following components:

- Identification/characterization of contaminated soil boundaries, surface and subsurface debris;
- Excavation and sorting of hazardous and non-hazardous materials, debris and ordnance;
- Removal and disposal of ordnance, debris and oversized material;
- On-site treatment (stabilization) of hazardous soils in the TCAAP CAMU;

- Off-site disposal of contaminated soils above site-specific cleanup goals;
- Backfill/regrade excavations;
- Restrict site access and use during remedy implementation;
- Three-year period of groundwater monitoring (Grenade Range only); and
- Construct a protective soil cover over PAH-impacted soil (1900 Yard Range of the Outdoor Firing Range only).

LUCs were identified as remedy components for some of the above sites (as listed above), but as remedy implementation has progressed, additional LUCs have been selected by the Army, as established in the LUCIP. These LUCs are identified and discussed in Section 7.4.1

#### **7.1.2 Remedy Implementation**

The shallow soil excavation work has been completed at both sites. The work plan for construction of the protective soil cover at the 1900 Yard Range of the Outdoor Firing Range was approved near the end of FY 2003, with construction anticipated to be completed in early FY 2004. The three-year period of groundwater monitoring at the Grenade Range was initiated in FY 2002, and will tentatively end in FY 2004 (a decision whether to continue or discontinue monitoring will be made after the FY 2004 data is reviewed). Sampling is conducted in accordance with groundwater monitoring plans that are reviewed and updated annually as part of the APR. The LUCs are being implemented by the National Guard in accordance with the LUCIP.

#### **7.1.3 System Operations/Operation and Maintenance (O&M)**

O&M procedures will be limited to maintaining the cautionary signs around the perimeter of the protective soil cover at the Outdoor Firing Range (when constructed). O&M would also include repair of any damage that compromises the required thickness for the protective soil cover, if such damage were to occur.

## **7.2 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW**

Not applicable (this is the first five-year review for these two sites).

## **7.3 FIVE-YEAR REVIEW PROCESS**

### **7.3.1 Administrative Components**

Administrative components were as described for OU1 (see Section 4.3.1).

### **7.3.2 Community Notification and Involvement**

Community notification was conducted as described for OU1 (see Section 4.3.2).

### **7.3.3 Document Review**

The primary documents reviewed were the following:

- TCAAP FY 2003 Annual Performance Report (APR), Draft, February 2004
- TCAAP Final APRs for Fiscal Years 1999, 2000, 2001, and 2002

Other site documents were also reviewed for information on remedial action objectives and cleanup levels (Closeout Reports and EE/CAs). The FY 2003 APR was the primary source for monitoring data and for determining the status at the end of this Five-Year Review period.



#### **7.3.4 Data Review**

##### Grenade Range

Remediation is complete. 2,179 cubic yards of metals-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. The Closeout Report for the Grenade Range has been approved, but final consistency has not yet been provided.

Groundwater monitoring data for FY 2003 is shown in Table 7-1, and monitoring well locations are shown on Figure 7-1. The monitoring data shows that there were a few detections above background levels. FY 2004 results will provide confirmation regarding these detections.

##### Outdoor Firing Range

Remediation is partially complete. 990 cubic yards of metals-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility, completing the soil removal work. The Closeout Report for this work has been approved, but final consistency has not yet been provided. A protective soil cover is anticipated to be constructed over 0.5 acres of the Outdoor Firing Range (at the 1900 Yard Range) where PAH-contaminated soils will remain in-place. The location of the protective soil cover is shown on Figure 5-1. Construction of the protective soil cover will be documented in an addendum to the Outdoor Firing Range Closeout Report.

#### **7.3.5 Site Inspection**

These sites were not readily accessible due to snow-covered roads, and were not inspected. A site inspection checklist for these two sites was completed and is included as Appendices A.10.

### **7.3.6 Interviews**

The information for the site inspection checklist was obtained through phone interviews and review of available documents. Discussions with these individuals did not reveal any significant problems or issues.

## **7.4 TECHNICAL ASSESSMENT**

### **7.4.1 *Question A: Is the Remedy functioning as intended by the decision documents?***

The review of remedial action objectives, documents, and available information suggest that the remedies for these sites are functioning as intended. The soil excavation, treatment, and off-site disposal has achieved the site-specific cleanup goals. The planned construction of a protective soil cover at the 1900 Yard Range of the Outdoor Firing Range is intended to prevent access to PAH-contaminated soils. The protective soil cover, when constructed, and in conjunction with land use controls, will effectively accomplish this added objective.

O&M procedures will be limited to maintaining the cautionary signs around the perimeter of the Outdoor Firing Range protective soil cover, when constructed. These signs will help ensure the short- and long-term protectiveness of the remedy by helping to prevent disturbance of the protective soil cover. O&M will also include repair of any damage that compromises the required thickness of the protective soil cover, if such damage were to occur.

The following LUCs have been selected for these two sites, as established in the LUCIP:

- 1) Prohibit activities that would exceed the exposure scenario under which the site was cleaned up (an “industrial use scenario” was utilized).

- 2) Prohibit activities that would disturb the protective soil cover at the Outdoor Firing Range (when constructed).

On July 30, 2003, the Army, the National Guard, and TWISS conducted the annual inspection of TCAAP sites for LUCs, as specified in the LUCIP. The checklist that was completed during the inspection is included as Appendix D. Other than completing the protective soil cover construction at the Outdoor Firing Range, the only item requiring additional action was that caution signs marking the edges of protective soil covers had not yet been installed (the signs were installed in early FY 2004). The LUCs appear to be adequate for these sites, as the property currently exists (under federal control).

**7.4.2      *Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?***

The remedial action objectives for Grenade Range and the Outdoor Firing Range remain valid. No changes to the remedy components of these sites are necessary.

The Grenade Range and the Outdoor Firing Range were not included in the health risk assessment in the OU2 ROD. However, the land use (industrial scenario), exposure scenarios, and methods that were used for health risk assessment and for determination of cleanup levels (where required) followed the same methodology as was documented in Appendix C of the OU2 ROD.

The cleanup levels for COCs for these two sites are listed in Table 3-1. These cleanup levels were originally developed in the EE/CA's for each of these sites, with final cleanup levels as documented in the Closeout Reports.

No groundwater COCs were established for the Outdoor Firing Range. Groundwater at the Grenade Range is currently being investigated (the determination whether to establish any COCs/cleanup levels has not yet been made).

For soil COCs, in order to verify the protectiveness of the remedy, three areas were reviewed: ARARs were checked; the toxicity values used in risk assessment calculations were checked for any changes; and, for any cleanup levels that were soil leaching-based, the drinking water or health-based standard that was utilized in the leaching number development was checked for any changes.

Lead was the only COC for which health-based guidance could be utilized to establish TBC values. The lead cleanup level of 1200 mg/kg (industrial scenario) was developed as described for OU2 soils, and remains a valid approach (refer to the discussion in Section 5.4.2).

The only COCs for which the cleanup levels were soil leaching-based were at the Grenade Range (Unit 1 groundwater). These were cadmium (0 to 3 feet above the water table) and lead (0 to 1 foot above the water table). The MPCA soil model utilized the Minnesota cadmium HRL of 4 ug/l and the lead action level at the tap of 15 ug/l. Since the applicable standards have not changed, no changes to the cadmium or lead cleanup levels need to be considered.

Lastly, the toxicity values used in risk assessment calculations were checked. To perform this check, the current toxicity data was obtained from the Integrated Information System Database (IRIS). IRIS is updated monthly and the check was performed in March 2004. The Health Effects Assessments Summary Tables (HEAST) have not been updated since 1997 and were not reviewed, given the outdated nature.

For these two sites, the toxicity data that was used to calculate health-risk based goals is presented in the EE/CAs for each site. The oral reference dose (RfDo) and/or oral slope factors (Sfo) listed in these tables were checked against IRIS and no changes in toxicity values were found.

Based on the above review, there are no changes to cleanup levels that need to be considered.

**7.4.3      *Question C: Has any other information come to light that could call into question the protectiveness of the remedy?***

No information has been obtained that could call into question the protectiveness of the remedy.

**7.4.4      Technical Assessment Summary**

Based on the remedial action objectives, data reviewed, and the site inspection, the remedies are functioning as intended. No changes in land use or exposure scenarios have occurred that would affect the protectiveness of the remedy. There have been no changes to toxicity values that were used in determining health risk-based cleanup levels, nor have there been any changes to any of the groundwater ARARs that were utilized to develop soil cleanup levels that were based on leaching. No information has been obtained that could call into question the protectiveness of the remedy.

**7.5            ISSUES**

Following review of the FY 2004 groundwater monitoring data from the Grenade Range, the Army, USEPA, and MPCA will need to decide whether to continue or discontinue monitoring.

Although the LUCIP is already being implemented, it was under review by the MPCA and USEPA at the end of FY 2003 (comment resolution was in progress). The LUCIP is not undergoing consistency review at this time due to a national-level debate between the USEPA and DOD regarding LUC enforcement authority. The Army has agreed to address the O&M-related regulatory comments on the LUCIP, but will not address other LUCIP comments where resolution of such comments could be affected by resolution of the national-level debate. It is

anticipated that these issues will be resolved in FY 2004. Resolution of LUC issues will allow final regulatory approval for the closeout reports.

## **7.6 RECOMMENDATIONS AND FOLLOW-UP ACTIONS**

The only recommendation is that the Army, USEPA, and MPCA need to work towards resolution of LUC issues, as discussed in the previous section.

## **7.7 PROTECTIVENESS STATEMENT**

The components of the remedy for the Grenade Range and Outdoor Firing Range remain protective of human health and the environment. The availability of these sites for industrial use has been restored. Review of the toxicity data upon which the health risk assessments for these sites were based showed that no changes that could potentially affect the protectiveness of the remedies have occurred. The protective soil cover that will be constructed at the 1900 Yard Range of the Outdoor Firing Range, in conjunction with land use controls, will effectively prevent exposure to contaminated soils/debris.

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## **8.0      Next Review**

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The next five-year review for the NB/AH Superfund Site must be completed within five years of this review, which will be approximately September 2009.

## 9.0 Approvals

The remedies reviewed in this report remain protective of human health and the environment, continue to comply with ARARs, and continue to be cost-effective.

### U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION V

Signature: Richard C. Karl Date: 9-23-04  
Printed Name: Richard C. Karl  
Title: Director, Superfund Division

### MINNESOTA POLLUTION CONTROL AGENCY

Signature: Michael Kanner Date: 9-28-04  
Printed Name: Michael Kanner  
Title: Manager of Superfund

### U.S. ARMY

Signature: Michael R. Fix Date: 27 SEP 2004  
Printed Name: MICHAEL R. FIX  
Title: COMMANDER'S REPRESENTATIVE



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## Tables

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**Table 3-1**  
**Chemicals of Concern (COCs) and Selected Cleanup Levels**  
**New Brighton/Arden Hills Superfund Site**

			Cleanup Level (ug/l) and Basis (1)			
Soil COC		Cleanup Level (mg/kg)	Groundwater COC			
<b>OU1</b>						
Deep Groundwater	None		1,1-Dichloroethane 1,1-Dichloroethene cis-1,2-Dichloroethene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethene			
			70 (RAL) 6 (HRL) 70 (MCL,RAL) 200 (MCL) 3 (HRL) 5 (MCL)			
<b>OU2</b>						
A	Antimony Barium Copper Lead Tetrachloroethene Trichloroethene	33.6 21,745 19,593 1200 0.5 1.44	Antimony 1,1-Dichloroethene 1,2-Dichloroethane Benzene Chloroform cis- 1,2-Dichloroethene Tetrachloroethene Trichloroethene			
			6 (HRL) 6(HRL) 4(HRL) 10(HRL) 60(HRL) 70(HRL) 7(HRL) 30(HRL)			
C	Antimony Arsenic Beryllium Lead Manganese Thallium	67.2 10 0.7 1200 2503 11.8	Site C has groundwater impacts that were outside of the CERCLA process at the time of this report; hence, they are outside of this five-year review. Refer to MPCA enforcement actions and Army response actions for the COCs.			
D	Trichloroethene PCB's Antimony Lead Nitroglycerine	0.416 10 67.2 1200 61.2		Refer to OU2 Deep Groundwater		
E	Antimony Barium Copper Lead Manganese	22.4 21,745 13,062 1200 834			None	
G	Trichloroethene	36.1	Refer to OU2 Deep Groundwater			
H	Antimony Arsenic Copper Lead Manganese	33.6 10 19,593 1200 2503		None		
I	None				1,2-Dichloroethene (cis and trans) Trichloroethene Vinyl Chloride	
						70(HRL) 30(HRL) 0.2(HRL)
K	None		1,2-Dichloroethene (cis and trans) Trichloroethene			
				70(HRL) 30(HRL)		
129-3	Antimony Lead Manganese Nitroglycerine Trichloroethene	22.4 1200 834 61.2 4.43				
					None	
129-5	Antimony Barium Lead	67.2 21,745 1200				None
			None			
				None		

**Table 3-1**  
**Chemicals of Concern (COCs) and Selected Cleanup Levels**  
**New Brighton/Arden Hills Superfund Site**

	Soil COC	Cleanup Level (mg/kg)	Groundwater COC	Cleanup Level (ug/l) and Basis ( <sup>1</sup> )
<u>OU2 cont.</u>				
129-15	Benzo[a]anthracene	0.215	None	
	Benzo[a]pyrene	0.021		
	Lead	1200		
Deep Groundwater	None		1,1,1-Trichloroethane	200(MCL)
			1,1-Dichloroethane	70(HRL)
			1,1-Dichloroethene	6(HRL)
			1,2-Dichloroethane	4(HRL)
			cis-1,2-Dichloroethene	70(MCL)
			Tetrachloroethene	5(MCL)
			Trichloroethene	5(MCL)
<u>OU3</u>				
Deep Groundwater	None		1,1-Dichloroethane	70(RAL)
			1,1-Dichloroethene	6(RAL)
			cis-1,2-Dichloroethene	70(MCL,RAL)
			1,1,1-Trichloroethane	200(MCL)
			1,1,2-Trichloroethane	3(RAL)
			Trichloroethene	5(MCL)
<u>Grenade Range</u>				
	Antimony	33	Under Evaluation	
	Cadmium			
	* 0-1 ft above GW	1.4		
	1-2 ft above GW	2.3		
	2-3 ft above GW	7		
	>3 ft above GW	50		
	Lead			
	0-1 ft above GW	270 <sup>(2)</sup>		
	>1 ft above GW	1200		
<u>Outdoor Firing Range</u>				
	Antimony	22.4	None	
	Copper	13,067		
	Lead	1200		
	Benzo(a)anthracene	0.645		
	Benzo(a)pyrene	0.0645		
	Indeno(1,2,3-cd) pyrene	0.645		

\* GW = groundwater table

Note 1: The basis for each cleanup level as presented in the respective RODs. For OU1, OU2, and OU3 deep groundwater, the lowest ARAR value was selected. For Sites A, I, and K, preference was given to the HRLs because this aquifer is not used for community water supplies, so MCLs do not apply.

MCL=federal Maximum Contaminant Level. HRL=state Health Risk Limit. RAL=state Recommended Allowable Limit (subsequently superseded by the HRLs).

Note 2: This value was derived based on the leaching pathway versus a direct exposure.

Table 4-1

## Status of Remedial Actions: FY 2003

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
<b>Operable Unit 1: Deep Groundwater</b>				
#1: Alternate Water Supply/Well Abandonment	Yes	Yes	No	
#2: Drilling Advisories	Yes	Yes	No	
#3: Groundwater Containment	Yes	Yes	No	The containment requirement is under review.
#4: Removal of VOCs by GAC (Discharge Quality)	Yes	Yes	No	
#5: Discharge of Treated Water	Yes	Yes	No	
#6: Groundwater Monitoring	Yes	Yes	No	
Overall Remedy	Yes	Yes	No	
<b>Operable Unit 2: Shallow Soil Sites</b>				
#1-7: Soil Remediation				
Site A	Yes	Yes	Partially	Closeout Report for metals was partially approved; however, see Note 1 at the end of the OU2 section of this table. See OU2 Site A Shallow Groundwater (below) for status on VOC soils.
Site C	Yes	Partially	No	Site was partially excavated FY 2000 - 2002. Excavation was suspended in FY 2002 due to high water table. Additional characterization was done in FY 2003. An alternatives analysis for this site was under review at the end of FY 2003.
Site E	Yes	Yes	Partially	Closeout Report was partially approved; however, see Note 1 at the end of the OU2 section of this table.

Table 4-1 (continued)

## Status of Remedial Actions: FY 2003

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
<b>Operable Unit 2: Shallow Soil Sites (continued)</b>				
#1-7: Soil Remediation (continued)				
Site H	Yes	Yes	Partially	Closeout Report was partially approved; however, see Note 1 at the end of the OU2 section of this table.
Site 129-3	Yes	Yes	Partially	Closeout Report was partially approved; however, see Note 1 at the end of the OU2 section of this table.
Site 129-5	Yes	Yes	Partially	Closeout Report was partially approved; however, see Note 1 at the end of the OU2 section of this table.
#8: Groundwater Monitoring	Yes	Yes	No	The 5-year monitoring was started in FY 2003, and will tentatively end in FY 2007.
#9: Characterization of Dumps:				
Site B	Yes	Yes	Yes	
Site 129-15	Yes	Yes	Partially	Closeout Report was partially approved in FY 2003; however, see Note 1 at the end of the OU2 section of this table. A modification to the ROD was being prepared at end of FY 2003.
Overall Remedy	Yes	Yes	Partially	

*Note 1: Closeout report has been approved, but final consistency will not be provided until concurrence on the land use control section of the report has been reached between the Army and the regulators or, alternatively, until the TCAAP LUCIP has received consistency approval from the regulators.*

**Table 4-1 (continued)**

**Status of Remedial Actions: FY 2003**

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
<b>Operable Unit 2: Deep Soil Sites</b>				
#1: Groundwater Monitoring	Yes	Yes	No	
#2: Restrict Site Access	Yes	Yes	No	
#3: SVE Systems (Deep)	Yes	Yes	Partially	Deep SVE systems will not be required at Sites D or G. The Site D VOC Closeout Report received consistency in FY 2002. The Site G VOC Closeout Report is in progress.
#4: Enhancements to SVE Systems	Yes	Yes	Yes	Neither system required operation with enhancements. The Site D SVE system was dismantled in FY 2001. The Site G SVE was dismantled in FY 2003.
#5: Maintain Existing Site Caps	Yes	Yes	No	
#6: Maintain Surface Drainage Controls	Yes	Yes	No	
#7: Characterize Shallow Soils and Dump	Yes	Partially	No	For Site D, 1381 cubic yards of contaminated soil were removed and transported off-site for disposal in FY 2003. A Closeout Report and a modification to the ROD were under review at the end of FY 2003. For Site G, a tech memo recommending improvements to the Site G cover received regulatory approval in FY 2003. A work plan for the cover design was also approved in FY 2003 and cover construction was in progress at the end of FY 2003.
Overall Remedy	Yes	Yes	No	

**Table 4-1 (continued)**

**Status of Remedial Actions: FY 2003**

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
<b>Operable Unit 2: Site A Shallow Groundwater</b>				
#1: Groundwater Monitoring	Yes	Yes	No	
#2: Groundwater Containment/Mass Removal	Yes	Yes	No	
#3: Drilling Advisory/Alternate Water Supply/Well Abandonment	Yes	Yes	No	
#4: Discharge of Extracted Water	Yes	Yes	No	
#5: Source Characterization/Remediation	Yes	Yes	No	SVE system operation was ceased near the end of FY 2002, due to minimal VOC removal rates. In FY 2003, a work plan to excavate the contaminated soil received regulatory approval. The SVE system was removed and 688 cubic yards of contaminated soil were excavated and transported off-site for disposal. A Closeout Report for the Former 1945 Trench soils was under regulatory review at the end of FY 2003.
Overall Remedy	Yes	Yes	No	

**Table 4-1 (continued)**

**Status of Remedial Actions: FY 2003**

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
<b>Operable Unit 2: Site I Shallow Groundwater</b>				
#1: Groundwater Monitoring	Yes	Yes	No	
#2: Groundwater Extraction	No	No	No	Pilot study determined that extraction remedies are not feasible. An amendment to the OU2 ROD is being pursued to change to a monitoring based remedy.
#3: POTW Discharge	No	No	No	See above.
#4: Additional Investigation	Yes	Yes	No	See above.
Overall Remedy	Yes	Yes	No	See above.
<b>Operable Unit 2: Site K Shallow Groundwater</b>				
#1: Groundwater Monitoring	Yes	Yes	No	
#2: Sentinel Wells	Yes	Yes	Yes	
#3: Hydraulic Containment	Yes	Yes	No	
#4: Groundwater Treatment	Yes	Yes	No	
#5: Treated Water Discharge	Yes	Yes	No	
#6: Discharge Monitoring	Yes	Yes	No	
#7: Additional Investigation	Yes	Yes	Yes	Well 03U621 was added as a sentinel well and is sampled annually, as listed in the monitoring plan
Overall Remedy	Yes	Yes	No	



**Table 4-1 (continued)**

**Status of Remedial Actions: FY 2003**

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
<b>Operable Unit 2: Deep Groundwater</b>				
#1: Hydraulic Containment and Contaminant Mass Removal	Yes	Yes	No	The TGRS Operating Strategy received consistency in FY2003 and was implemented in FY2003.
#2: Groundwater Treatment	Yes	Yes	No	
#3: Treated Water Discharge	Yes	Yes	No	
#4: Institutional Controls	Yes	Yes	No	
#5: Review of New Technologies	Yes	Yes	No	
#6: Groundwater Monitoring	Yes	Yes	No	
Overall Remedy	Yes	Yes	No	
<b>Operable Unit 3: Deep Groundwater</b>				
#1: Groundwater Extraction	Yes	Yes	No	The PGRS flowrate was reduced to 0 gpm in FY 2001 & 2002. Operation during FY 2003 was solely to satisfy peak water demand; not for the purpose of groundwater remediation.
#2: Groundwater Treatment	Yes	Yes	No	See above comment under Remedy Component #1.
#3: Use of Water for Municipal Supply	Yes	Yes	No	See above comment under Remedy Component #1.
#4: Groundwater Monitoring	Yes	Yes	No	
Overall Remedy	Yes	Yes	No	

**Table 4-2**  
**OU1 Pumping/VOC Mass Removal Data**

**Fiscal Year 2003**

		NBCGRS Wells						Total NBCGRS Wells
		Well # 3	Well # 4	Well # 5	Well # 6	Well # 14	Well # 15	
Oct-02	Pumpage (1000 gals)	10,874	39,392	4,394	136	27,777	39,909	122,482
	VOC Level (ug/l)	55	63	170	100	34	120	
	Total VOCs (lbs)	5.0	21	6.2	0.1	7.9	40	80
Nov-02	Pumpage (1000 gals)	18,080	38,527	180	160	32,600	38,540	128,087
	VOC Level (ug/l)	49	58	140	96	27	120	
	Total VOCs (lbs)	7.4	19	0.2	0.1	7.3	39	72
Dec-02	Pumpage (1000 gals)	16,877	39,745	138	137	39,216	40,190	136,303
	VOC Level (ug/l)	46	54	140	86	29	100	
	Total VOCs (lbs)	6.5	18	0.2	0.1	9.5	34	68
Jan-03	Pumpage (1000 gals)	3,075	26,499	185	150	26,637	26,839	83,385
	VOC Level (ug/l)	50	62	170	100	30	120	
	Total VOCs (lbs)	1.3	14	0.3	0.1	6.7	27	49
Feb-03	Pumpage (1000 gals)	12,991	28,214	244	203	25,983	31,361	98,996
	VOC Level (ug/l)	68	77	160	92	18	77	
	Total VOCs (lbs)	7.4	18	0.3	0.2	3.9	20	50
Mar-03	Pumpage (1000 gals)	16,874	37,827	136	110	37,515	39,955	132,417
	VOC Level (ug/l)	69	70	170	100	25	97	
	Total VOCs (lbs)	9.7	22	0.2	0.1	7.8	32	72
Apr-03	Pumpage (1000 gals)	3,861	26,736	117	98	23,222	28,653	82,687
	VOC Level (ug/l)	48	72	160	100	15	78	
	Total VOCs (lbs)	1.5	16	0.2	0.1	2.9	19	39
May-03	Pumpage (1000 gals)	19,602	33,651	98	96	34,863	39,282	127,592
	VOC Level (ug/l)	69	78	170	100	27	96	
	Total VOCs (lbs)	11	22	0.1	0.1	7.9	31	73
Jun-03	Pumpage (1000 gals)	21,680	36,348	106	6,026	39,385	31,397	134,942
	VOC Level (ug/l)	63	73	160	110	31	110	
	Total VOCs (lbs)	11	22	0.1	5.5	10	29	78
Jul-03	Pumpage (1000 gals)	22,463	39,294	88	70	41,195	41,101	144,211
	VOC Level (ug/l)	61	72	171	113	41	123	
	Total VOCs (lbs)	11	24	0.1	0.1	14	42	92
Aug-03	Pumpage (1000 gals)	17,439	44,560	54	44	43,953	44,631	150,681
	VOC Level (ug/l)	46	60	170	110	75	110	
	Total VOCs (lbs)	6.7	22	0.1	0.04	28	41	98
Sep-03	Pumpage (1000 gals)	12,282	39,987	317	236	35,362	40,183	128,367
	VOC Level (ug/l)	28	48	140	88	41	97	
	Total VOCs (lbs)	2.9	16	0.4	0.2	12	33	64
<b>Fiscal Year 2003 Totals:</b>								
	Pumpage (1000 gals)	176,098	430,780	6,057	7,466	407,708	442,041	1,470,150
	Total VOCs (lbs)	82	233	8	7	118	386	835

**Table 4-3**  
**OU1, PGAC Effluent Water Quality**

**Fiscal Year 2003**

Influent Well Monitoring							Operational Performance Monitoring															
Sampling Date	Well #3	Well #4	Well #5	Well #6	Well #14	Well #15	Contactor #1		Contactor #2		Contactor #3		Contactor #4		Contactor #5		Contactor #6		Contactor #7		Contactor #8	
							A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
<i>"A" Vessels are the Lead Vessels.</i>																						
31-Oct-02	55	63	170	100	34	120	0	NS	0	NS	1.6	NS	0	NS	0	NS	0	NS	0	NS	0	NS
3-Nov-02	49	58	140	96	27	120	0	0	1.2	0	2.2	0	1.4	0	1.2	0	1.1	0	0	0	0	0
31-Dec-02	46	54	140	86	29	100	1.6	0	1.8	0	3.7	0	1.8	0	1.6	0	1.9	0	1.7	0	1	0
31-Jan-03	50	62	170	100	30	120	2.1	0	2.1	0	4.4	0	2.3	0	2	0	2.1	0	2.1	0	1.3	0
<i>GAC replaced in contactors 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A between January 7, 2003 and February 3, 2003. "B" Vessels become the Lead Vessels.</i>																						
28-Feb-03	68	77	160	92	18	77	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
31-Mar-03	69	70	170	100	25	97	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
<i>GAC replaced in contactors 1B, 2B, 3B, 4B, 5B, 6B, 7B, 8B between April 8, 2003 and May 6, 2003. "A" Vessels become the Lead Vessels.</i>																						
30-Apr-03	48	72	160	100	15	78	0	NS	0	NS	0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
31-May-03	69	78	170	100	27	96	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
30-Jun-03	63	73	160	110	31	110	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
31-Jul-03	61	72	171	113	41	123	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
31-Aug-03	46	60	170	110	75	110	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
30-Sep-03	28	48	140	88	41	97	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS

**Notes:**

- 1) All water quality results shown are for Total VOCs (ug/l).
- 2) NS = Not Sampled.
- 3) The highlighted results indicate those results that are representative of effluent water quality for the given pair of contactor vessels (only the A or B vessel result is highlighted since vessels are operating in series).

**Table 5-1**  
**Groundwater Quality Data for OU2 Shallow Soil Site**  
**5-Year Groundwater Monitoring**

**Fiscal Year 2003**

	01U119 (Site A)	03U089 (Site E)	01U060 (Site H)	03U087 (Site 129-3)	03U087D (Site 129-5)	03U097 (Site 129-5)	MDH HRL <sup>(1)</sup>
	6/18/2003	6/18/2003	6/18/2003	6/18/2003	6/18/2003	6/18/2003	
<b>Metals (ug/L)</b>							
Antimony	<5.00	B 0.69	B 3.8	<5.00		<5.00	6 <sup>(2)</sup>
Arsenic			3.3				(Note 3)
Barium	48	31				310	2000
Copper	B 1.8 (J169)	B 1.2 (J169)	9.6 (J169)				1000
Lead	<2.00	B 0.20 (UB0.2)	B 0.38 (UB0.2)	B 0.24 (UB0.2)		<2.00	15 <sup>(4)</sup>
Manganese		B 0.75 (UB0.4)	<b>1200</b>	B 0.53 (UB0.4)			1000
<b>Explosives (ug/L)</b>							
Nitroglycerine				<0.970	<0.970		(Note 3)
<b>VOCs (ug/L)</b>							
1,1,1-Trichloroethane				<1.0			600
1,1,2,2-Tetrachloroethane				<1.0			2
1,1,2-Trichloroethane				<1.0			3
1,1-Dichloroethane				<1.0			70
1,1-Dichloroethene				<1.0			6
1,2-Dichloroethane				<1.0			4
1,2-Dichloropropane				<1.0			5
2-Butanone				<10			4000
2-Hexanone				<10			(Note 3)
4-Methyl-2-Pentanone				<10			300
Acetone				JP 5.3			700
Benzene				<1.0			10
Bromodichloromethane				<1.0			6
Bromoform				<1.0			40
Bromomethane				<1.0			10
Carbon Disulfide				<1.0			700
Carbon Tetrachloride				<1.0			3
Chlorobenzene				<1.0			100
Chloroethane				<1.0			280
Chloroform				<1.0			60
Chloromethane				<1.0			80

**Table 5-1**  
**Groundwater Quality Data for OU2 Shallow Soil Site**  
**5-Year Groundwater Monitoring**

**Fiscal Year 2003**

	01U119 (Site A)	03U089 (Site E)	01U060 (Site H)	03U087 (Site 129-3)	03U087D (Site 129-5)	03U097 (Site 129-5)	MDH HRL <sup>(1)</sup>
	6/18/2003	6/18/2003	6/18/2003	6/18/2003	6/18/2003	6/18/2003	
<u>VOCs (ug/L) (cont'd)</u>							
cis-1,2-Dichloroethene				<1.0			70
cis-1,3-Dichloropropene				<1.0			2
Dibromochloromethane				<1.0			80
Ethylbenzene				<1.0			700
m&p-Xylene				<2.0			10,000
Methylene Chloride				<1.0			50
o-Xylene				<1.0			10,000
Styrene				<1.0			(Note 3)
Tetrachloroethene				<1.0			7
Toluene				<1.0			1000
trans-1,2-Dichloroethene				<1.0			100
trans-1,3-Dichloropropene				<1.0			2
Trichloroethene				JP 0.17			30
Vinyl Chloride				<1.0			0.2

Notes:

- (1) As approved in the FY2002 Annual Performance Report, the Minnesota Department of Health (MDH) Health Risk Limits (HRLs) are used for evaluating groundwater quality results. Values exceeding the HRL are shaded.
  - (2) For Site A Shallow Groundwater, this is also the Cleanup level from Table 1 of the OU2 ROD.
  - (3) No HRL has been established for this analyte.
  - (4) No HRL has been established for this analyte. MDH utilizes 15 ug/l as the Action Level "at the tap".
- D Duplicate sample.
- JP The value is below the reporting level, but above the method detection limit. Results should be considered estimated.
- B The value is below the reporting level, but above the method detection limit. Results should be considered estimated.
- JI The percent recovery for the interference check sample was below the lower QC limit (the percent recovery is listed after "JI").  
The sample result could be biased low.
- UB The sample result was less than 5 times the level detected in a blank (the result for the blank is listed after "UB").  
The sample result can be considered non detect at an elevated detection limit.

**Table 5-2  
Deep Groundwater Data Near Sites D and G**

**Fiscal Year 2003**

	Tetrachloro- ethene (ug/l)	Trichloro- ethene (ug/l)	1,1-Dichloro- ethene (ug/l)	cis-1,2-Dichloro- ethene (ug/l)	1,1-Dichloro- ethane (ug/l)	1,1,1-Trichloro- ethane (ug/l)	1,2-Dichloro- ethane (ug/l)
OU2 Cleanup Level <sup>(1)</sup>	5	5	6	70	70	200	4

Site D

03U018	6/17/03	< 1.0	140	2.8	12	4.9	18	< 1.0
03U093	6/16/03	< 1.0	69	1.7	JP 0.69	JP 0.48	23	< 1.0
03U096	6/16/03	< 1.0	15	1.9	< 1.0	5.4	2.9	< 1.0
03L018	6/17/03	< 1.0	JP 0.20	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Site G

03U014	6/19/03	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03U094	6/11/03	< 1.0	170	18	2.5	5.7	96	< 1.0
03L014	6/19/03	< 1.0 U	250	4.8	1.0	4.5	140	< 1.0

Notes:

- (1) Cleanup levels for Deep Groundwater are from Table 1 of the OU2 ROD. Values that exceed the cleanup level are shaded.  
 JP The value is below the reporting level, but above the method detection limit. Results should be considered estimated.  
 U The analyte is non-detect with the associated value being the quantitation limit.

**Table 5-3  
Site A Pumping Data**

**Fiscal Year 2003**

Monthly Average Flowrate (gpm)

	01U351 (EW1)	01U352 (EW2)	01U353 (EW3)	01U354 (EW4)	Total
				Target Flowrate:	15.0
Oct-02	3.9	3.2	3.7	4.3	15.1
Nov-02	4.4	3.9	4.6	5.2	18.1
Dec-02	4.5	3.6	4.1	5.0	17.2
Jan-03	4.8	3.2	3.7	5.4	17.1
Feb-03	4.4	3.9	3.6	4.7	16.5
Mar-03	4.5	3.0	3.8	4.7	16.0
Apr-03	4.5	3.0	4.1	4.9	16.4
May-03	4.3	2.7	4.0	4.9	15.9
Jun-03	4.7	3.3	4.2	4.8	17.1
Jul-03	4.6	4.0	4.1	4.2	16.9
Aug-03	4.5	3.3	4.1	4.7	16.5
Sep-03	3.0	4.3	4.3	4.9	16.5
<b>FY 2003 Averages:</b>	<b>4.3</b>	<b>3.5</b>	<b>4.0</b>	<b>4.8</b>	<b>16.6</b>

**Table 5-4  
Site A Monthly VOC Removal**

**Fiscal Year 2003**

Month	1,2-Dichloroethene (cis and trans) (ug/l)	Trichloroethene (ug/l)	Total VOCs in System Effluent (ug/l)	Conversion Factor (l*lb)/(ug*gal)	Water Pumped (gallons)	Total VOCs Removed by Extraction System (lbs)
Total Gallons Pumped and VOCs Removed Through September 30, 2002:					121,591,443	37.0
Oct-02	31.63	0.82	32.45	8.35E-09	674,203	0.18
Nov-02	36.67	0.95	37.62	8.35E-09	701,968	0.22
Dec-02	24.48	0.75	25.23	8.35E-09	839,844	0.18
Jan-03	18.53	0.82	19.35	8.35E-09	762,300	0.12
Feb-03	35.78	0.86	36.64	8.35E-09	666,502	0.20
Mar-03	23.61	0.85	24.46	8.35E-09	715,971	0.15
Apr-03	14.53	0.67	15.20	8.35E-09	709,070	0.09
May-03	17.48	0.64	18.12	8.35E-09	678,693	0.10
Jun-03	16.58	0.80	17.38	8.35E-09	762,727	0.11
Jul-03	32.67	0.97	33.64	8.35E-09	729,134	0.20
Aug-03	62.10	1.1	63.20	8.35E-09	704,121	0.37
Sep-03	20.39	0.66	21.05	8.35E-09	753,465	0.13
<b>Total Gallons Pumped and VOCs Removed for Fiscal Year 2003:</b>					<b>8,697,998</b>	<b>2.1</b>
<b>Total Gallons Pumped and VOCs Removed Since System Start-up:</b>					<b>130,289,441</b>	<b>39.1</b>

Note:

1) Total VOC concentrations and mass removal calculations do not include estimated concentrations for compounds reported as "not detected".



**Table 5-5**  
**Site A Effluent Water Quality**

**Fiscal Year 2003**

	cis-1,2- Dichloroethene (ug/l)	trans-1,2- Dichloroethene (ug/l)	Trichloroethene (ug/l)	1,1,1- Trichloroethane (ug/l)	Mercury (ug/l)
Discharge Limits:	3000	3000	3000	3000	2
22-Oct-02	31	JP 0.63	JP 0.82	<1.0	<0.100
14-Nov-02	36	JP 0.67	JP 0.95	<1.0	<0.100
12-Dec-02	24 (JS69)	JP 0.48	JP 0.75	<1.0	<0.100
28-Jan-03	18	JP 0.53	JP 0.82	<1.0	<0.100
13-Feb-03	35	JP 0.78	JP 0.86	<1.0	<0.100
12-Mar-03	23	JP 0.61	JP 0.85	<1.0	<0.100
29-Apr-03	14	JP 0.53	JP 0.67	<1.0	<0.100 (JS45)
28-May-03	17	JP 0.48	JP 0.64	<1.0	<0.100
09-Jun-03	16	JP 0.58	JP 0.80	<1.0	<0.100
28-Jul-03	32	JP 0.67	JP 0.97	<1.0	<0.100
28-Aug-03	61	1.1	1.1	<1.0	<0.100
29-Sep-03	20	JP 0.39	JP 0.66	<1.0	<0.100

**Notes:**

JP The value is below the reporting limit, but above the method detection limit. Results should be considered estimated.

JS The percent recovery for the matrix spike was below the lower QC limit (the percent recovery is listed after "JS").  
The sample result could be biased low.

TABLE 5-6

**GROUNDWATER QUALITY DATA  
FISCAL YEAR 2003  
SITE I, TCAAP  
ARDEN HILLS, MINNESOTA**

<u>Location</u>	<u>Date</u>	<i>1,1,1-Trichloroethane</i> <u>111TCE</u>	<i>1,1,2-Trichloroethane</i> <u>112TCE</u>	<i>1,1-Dichloroethylene</i> <u>11DCE</u>	<i>1,1-Dichloroethane</i> <u>11DCLE</u>	<i>cis-1,2-Dichloroethylene</i> <u>C12DCE</u>	<i>Vinyl chloride</i> <u>C2H3CL</u>	<i>Chloroform</i> <u>CHCL3</u>	<i>trans-1,2-Dichloroethylene</i> <u>T12DCE</u>	<i>Tetrachloroethylene</i> <u>TCLEE</u>	<i>Trichloroethylene</i> <u>TRCLE</u>	<i>1,2-Dichloroethane</i> <u>12DCLE</u>
01U064	6/5/2003	<1	<1	<1	<1	79	9.4	<1	5.6	<1	1.3	<1
01U064 dup	6/5/2003	<1	<1	<1	<1	76	9.0	<1	5.3	<1	1.2	<1
01U636	6/5/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
482089 (I04MW)	6/5/2003	<1	<1	<1	<1	2.2	<1	<1	<1	<1	66.0	<1
01U640	6/5/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.29JP	<1
482086 (I01MW)	6/5/2003	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
482088 (I02MW)	6/5/2003	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
482087 (I05MW)	6/5/2003	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Notes:

Concentrations in ug/L.

J - Value is estimated.

P - Results less than reporting level but greater than instrumental detection limit.

TABLE 5-7

**SUMMARY OF MONTHLY VOC REMOVAL  
FISCAL YEAR 2003  
SITE K, TCAAP  
ARDEN HILLS, MINNESOTA**

<u>Month</u>	<u>Total Monthly Flow (million gallons)</u>	<u>Total VOC Influent Concentration (ug/L)</u>	<u>Total VOC Effluent Concentration (ug/L)</u>	<u>Total VOCs in Treatment Center Discharge (grams)</u>	<u>Total VOC Mass Removed (grams)</u>	<u>Total VOC Mass Removed (lbs)</u>
Cumulative As Of September 2002 (FY02)						130.5
October	0.66911	31.2	0	0.00	79.01	0.17
November	0.46468	31.2	0	0.00	54.87	0.12
December	0.36588	31.2	0	0.00	43.21	0.10
January	0.32265	218.8	1	1.22	265.63	0.59
February	0.27574	218.8	1	1.04	227.01	0.50
March	0.28837	218.8	1	1.09	237.41	0.52
April	0.32299	260.6	1.1	1.34	316.83	0.70
May	0.58311	260.6	1.1	2.42	571.98	1.26
June	0.53737	260.6	1.1	2.23	527.11	1.16
July	0.55898	176.4	0	0.00	372.72	0.82
August	0.42103	176.4	0	0.00	280.74	0.62
September	0.35974	176.4	0	0.00	239.87	0.53
Totals - FY03	5.16965			9.4	3216.4	7.1
Cumulative To Date						137.6

Notes:

- (1) Influent and Effluent VOC concentrations from 12/04/02, 3/06/03, 6/16/03 and 9/11/03 quarterly samples, respectively.  
(2) Calculations based on compounds with concentrations above the CRDL only.

TABLE 5-8

**TREATMENT SYSTEM CONCENTRATIONS (ORGANICS)**  
**FISCAL YEAR 2003**  
**SITE K, TCAAP**  
**ARDEN HILLS, MINNESOTA**

<i>Location</i>	<i>Sample Date</i>	1,1-Dichloroethane <i>11DCLE</i>	1,1-Dichloroethane <i>11DCE</i>	1,2-Dichloroethane <i>12DCLE</i>	cis-1,2-Dichloroethene <i>C12DCE</i>	trans-1,2-Dichloroethene <i>T12DCE</i>	Trichloroethene <i>TRCLE</i>	Vinyl chloride <i>C2H3CL</i>
Effluent	12/4/2002	ND	ND	ND	0.092 JP	ND	0.15 JP	ND
Effluent	12/4/2002	ND D	ND D	ND D	0.1 JPD	ND D	0.15 JPD	ND D
Effluent	3/6/2003	ND	ND	ND	0.62 JP	ND	1.0	ND
Effluent	3/6/2003	ND D	ND D	ND D	0.53 JPD	ND D	0.93 JPD	ND D
Effluent	6/16/2003	ND	ND	ND	0.64 JP	ND	1.1	ND
Effluent	6/16/2003	ND D	ND D	ND D	0.48 JPD	ND D	0.89 JPD	ND D
Effluent	9/10/2003	ND	ND	ND	0.20 JP	ND	ND	ND
Effluent	9/10/2003	ND D	ND D	ND D	0.25 JPD	ND D	ND JPD	ND D
Influent	12/4/2002	ND	ND	ND	7.0	1.1	23	0.14 JP
Influent	3/6/2003	ND	ND	ND	51	6.7	160	1.10
Influent	6/16/2003	ND	ND	ND	72	8.6	180	0.68 JP
Influent	9/10/2003	ND	ND	ND	59	7.4	110	0.63 JP
MDL	12/02	0.069	0.164	0.0736	0.084	0.072	0.0909	0.093
MDL	3/03, 6/03	0.108	0.107	0.148	0.171	0.158	0.126	0.277
MDL	9/03	0.355	0.199	0.297	0.171	0.168	0.195	0.456
CRDL		1	1	1	1	1	1	1
REQ.		—	7.0	3.8	70	100	10	0.18

**TABLE 5-8**  
**TREATMENT SYSTEM CONCENTRATIONS (ORGANICS)**  
**FISCAL YEAR 2003**  
**SITE K, TCAAP**  
**ARDEN HILLS, MINNESOTA**

Notes:

Results are reported in µg/L unless otherwise noted.

D - Duplicate Analysis

J - Value Estimated

P - Results less than reporting level but greater than instrument detection limit.

ND - Not Detected

MDL - Method Detection Limit

CRDL - Contract Required Detection Limit

REQ - Substantive Requirement Document Concentration Limit,  
Maximum Daily Concentration

TABLE 5-9

**EXTRACTION WELL WATER PUMPED  
FISCAL YEAR 2003  
TGRS, TCAAP  
ARDEN HILLS, MINNESOTA**

Volume of Water Pumped (gallons)																			
	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	SC1	SC2	SC3	SC4	SC5	TOTAL
October 2002	7,346,800	2,667,100	8,752,100	8,812,800	8,697,900	9,635,900	0	6,189,900	7,771,200	7,235,400	4,189,800	0		1,177,000	1,455,600	287,300	0	5,063,700	79,282,500
November 2002	4,289,400	1,576,300	9,206,000	9,156,700	8,872,000	9,954,800	0	6,255,100	8,124,200	9,757,400	4,447,000	0		1,205,300	1,587,100	0	0	5,207,300	79,638,600
December 2002	5,809,100	0	8,891,100	9,038,500	8,809,200	10,592,200	7,900	6,413,100	11,234,800	3,498,200	4,350,600	0	2,031,700	1,185,600	1,459,000	6,900	9,400	5,409,400	78,746,700
January 2003	7,577,300	0	5,624,800	8,819,200	6,460,000	10,205,500	0	6,090,300	12,579,200	0	2,777,700	0		2,986,300	804,700	1,133,500	0	5,082,300	70,140,800
February 2003	9,404,800	0	7,112,800	7,588,900	7,815,700	9,879,400	0	5,816,900	11,458,800	0	3,519,100	0		3,526,600	1,280,000	1,229,500	0	4,754,200	73,386,700
March 2003	10,383,200	0	8,091,000	8,225,900	8,989,100	9,767,900	0	5,773,200	12,963,200	0	3,994,300	0		3,950,700	1,152,400	875,100	0	4,679,400	78,845,400
April 2003	9,896,000	0	7,041,300	7,681,000	9,003,300	8,704,900	0	5,477,900	12,369,500	0	3,768,200	0		4,010,000	1,319,800	1,048,500	0	4,617,450	74,937,850
May 2003	9,562,400	0	8,864,900	7,111,100	9,319,400	9,396,300	0	6,103,000	12,737,500	0	3,856,800	0		4,233,300	1,384,000	1,032,700	0	4,773,600	78,675,000
June 2003	9,169,000	0	8,361,900	7,213,600	8,757,700	8,270,900	0	5,710,100	11,736,000	0	3,656,300	0		3,777,500	1,321,900	999,400	0	3,969,400	72,943,700
Jul. 2003	9,058,800	0	8,542,600	8,633,900	9,119,700	9,324,800	0	5,723,600	12,234,400	0	3,509,400	0		3,741,200	1,291,700	921,000	0	4,065,200	76,166,300
August 2003	8,980,400	0	8,215,800	8,569,900	8,257,900	8,937,900	0	5,460,500	11,524,400	0	3,289,900	0		3,844,700	1,222,800	858,900	0	4,188,800	73,351,900
September 2003	7,856,800	0	8,171,200	7,668,300	7,334,600	8,834,200	0	5,398,400	11,119,300	0	3,237,200	0		2,706,400	1,211,800	1,016,500	0	3,625,300	68,180,000
TOTAL FY 2003	99,634,000	4,243,400	96,875,500	98,519,800	101,436,500	113,504,700	7,900	70,412,000	135,852,500	20,491,000	44,596,300	0	34,808,400	14,557,000	13,616,800	294,200	9,400	55,436,050	904,295,450
FY9	67,563,900	69,364,850	72,257,490	75,237,700	76,328,500	100,611,510	138,278,100	42,329,200	60,613,300	54,516,600	93,534,437	60,210,340	0	13,867,660	20,078,880	36,660,309	12,593,300	39,307,600	1,033,353,676
FY90	70,722,500	69,450,060	73,633,450	80,511,000	71,897,000	105,220,300	117,609,400	40,747,900	59,883,400	95,227,900	40,939,800	63,867,460	0	11,281,750	19,278,830	35,609,300	15,260,500	37,275,400	1,008,415,750
FY91	99,482,900	102,399,960	98,521,050	104,674,800	105,191,900	137,181,500	153,080,700	63,366,100	77,083,200	130,044,100	54,094,000	95,329,240	0	17,111,600	23,724,440	46,611,600	20,228,000	54,182,500	1,382,327,590
FY92	103,612,700	105,175,800	104,103,100	105,741,800	106,869,400	140,681,700	155,934,000	61,053,000	78,498,200	129,041,800	52,635,900	93,170,000	0	17,472,600	21,165,900	50,254,500	22,045,100	53,891,100	1,401,346,600
FY93	104,610,228	97,262,300	102,039,200	102,785,395	105,685,800	140,275,000	153,555,300	60,334,400	78,395,400	129,093,800	49,765,700	90,094,600	0	16,887,368	24,623,700	51,413,200	25,104,180	55,980,600	1,388,206,172
FY94	99,994,100	75,083,100	98,156,900	91,607,800	93,671,400	126,439,100	140,213,900	63,403,400	71,130,200	115,719,700	48,857,400	87,868,300	0	17,351,750	19,244,100	45,125,400	20,715,000	46,698,300	1,261,279,850
FY95	117,949,700	68,908,100	115,358,700	104,187,500	102,308,300	141,348,900	147,788,900	68,183,400	75,017,600	128,802,200	53,372,700	100,424,400	0	16,572,496	23,173,800	47,176,100	24,037,800	51,323,400	1,385,933,996
FY96	125,047,900	55,550,500	129,118,200	103,113,100	106,158,000	142,485,500	100,031,500	68,182,700	80,266,000	130,823,300	50,345,100	95,047,900	0	7,152,620	22,803,400	50,843,300	23,411,400	51,382,800	1,341,763,220
FY97	103,065,700	63,195,800	116,976,600	91,590,200	103,636,700	141,103,600	133,956,600	60,633,500	77,677,200	129,353,600	47,439,800	10,526,600	0	13,381,400	24,099,800	48,925,600	3,166,500	51,146,000	1,213,035,110
FY98	115,684,000	58,471,500	119,211,700	88,388,000	104,434,700	129,709,500	137,341,100	63,132,100	69,450,500	120,372,500	51,393,600	12,100	0	13,379,800	21,415,000	51,647,100	200	49,964,500	1,196,007,900
FY99	98,763,900	49,003,200	96,200,600	109,201,100	111,041,600	125,486,690	133,823,800	66,488,100	77,138,800	127,121,600	47,648,300	35,500	0	15,373,580	22,786,400	46,156,600	8,600	31,946,300	1,158,224,870
FY00	101,335,000	49,614,400	108,593,300	98,476,400	107,988,500	106,634,800	132,057,200	73,093,500	78,949,500	126,707,800	56,705,000	9,500	0	17,193,900	20,904,400	33,691,100	2,850	36,491,400	1,148,448,350
FY01	119,183,600	40,051,700	114,852,000	93,556,600	104,756,160	108,585,000	80,152,100	73,738,600	77,474,700	127,575,700	53,743,900	58,400	0	14,039,400	25,913,900	24,268,000	5,200	55,208,400	1,113,163,360
FY02	108,090,530	27,491,872	68,481,181	105,492,918	102,639,752	114,021,382	37,292,226	52,533,796	73,184,102	87,751,296	36,573,692	0	0	11,635,280	14,009,400	18,054,231	0	60,065,219	917,318,879
FY03	99,634,000	4,243,400	96,875,500	98,519,800	101,436,500	113,504,700	7,900	70,412,000	135,852,500	20,491,000	44,596,300	0	34,808,400	14,557,000	13,616,800	294,200	9,400	55,436,050	904,295,450
Days of Downtime	46	1	26	21	29	19	0	18	15	2	23	0	19	29	27	0	0	18	
Downtime																			
Corrected Flow Rate	213	8	197	198	208	227	0	141	269	39	90	0	70	30	28	1	0	111	1,830
Corrected for FM 1 and 2 rates	187	8	182	185	190	213	0	132	255	38	84	0	65	27	26	1	0	104	1696
Corrected for FM 1 and 2 rates and DT	210	8	195	195	205	224	0	139	265	39	89	0	69	29	27	1	0	109	1804.4

**OPERATING STRATEGY COMPARISON**

	B11, B1, B2, B13	B4, B5, B6	B4, B5, B6, B8, B9	B4, B5, B6, B8, B9, B10	Total System
FY03 Uncorrected Flow Rate (gpm)	349	596	989	1,028	1,721
FY03 Corrected For Downtime Flow Rate (gpm)	361	634	1,043	1,083	1,830
MOS Operational Minimum (gpm)	460	600	1,010	1,010	1,800

TABLE 5-10

**VOC MASS LOADING SUMMARY  
FISCAL YEAR 2003  
TGRS, TCAAP  
ARDEN HILLS, MINNESOTA**

<i>Well</i>	<i>Percent Contribution to VOC Mass Removal</i>	<i>FY 2003 Total Pounds VOC Mass Removed</i>
B1	5.6%	170.4
B2	0.1%	2.1
B3	0.2%	6.6
B4	14.9%	452.9
B5	10.1%	305.8
B6	5.7%	174.5
B7	0.0%	0.0
B8	0.5%	14.9
B9	6.2%	187.6
B10	0.0%	0.2
B11	0.1%	1.7
B13	1.6%	48.8
SC1	4.1%	125.2
SC2	0.3%	9.7
SC3	0.0%	0.0
SC4	0.0%	0.0
SC5	50.7%	1540.7
<i>Fiscal Year 2003 Total (lbs)</i>		<b>3041</b>
<i>Daily Average (lbs/day)</i>		<b>8.3</b>

**HISTORICAL TOTAL**

<i>Fiscal Year</i>	<i>Pounds VOC Mass Removed</i>
2003	3,041
2002	2,852
2001	3,418
2000	4,499
1999	4,878
1998	6,132
1997	6,210
1996	10,655
1995	13,355
1994	15,070
1993	20,165
1992	24,527
1991	26,760
1990	18,005
1989	19,510
1988	4,800
1987	2,100
<i>Total</i>	<i>185,977</i>

(First year of full scale system)

TABLE 6-1

**SUMMARY OF MONTHLY VOC REMOVAL  
FISCAL YEAR 2003  
PGRS, TCAAP  
ARDEN HILLS, MINNESOTA**

<u>Month</u>	<u>Total Monthly Flow<sup>(1)</sup> (million gallons)</u>	<u>Total VOC Influent<sup>(2)</sup> Concentration</u>	<u>Total VOC Effluent Concentration</u>	<u>Total VOCs in Treatment Center Discharge (gm)</u>	<u>Total VOC Mass Removed (gm)</u>	<u>Total VOC Mass Removed (lb)</u>
Cumulative As Of September 2002 (FY02)						132.0
October	0.00000	0.0	0	0.00	0.00	0.00
November	0.00000	0.0	0	0.00	0.00	0.00
December	0.01300	0.0	0	0.00	0.00	0.00
January	0.00000	0.0	0	0.00	0.00	0.00
February	0.00000	0.0	0	0.00	0.00	0.00
March	0.02000	0.0	0	0.00	0.00	0.00
April	0.00000	0.0	0	0.00	0.00	0.00
May	0.37300	0.0	0	0.00	0.00	0.00
June	2.80000	0.0	0	0.00	0.00	0.00
July	4.29900	0.0	0	0.00	0.00	0.00
August	17.54700	0.0	0	0.00	0.00	0.00
September	7.52700	0.0	0	0.00	0.00	0.00
Totals - FY03	32.57900			0.0	0.0	0.0
Cumulative To Date						132.0

Notes:<sup>(1)</sup>Data collected by City of New Brighton.<sup>(2)</sup>Data collected by City of New Brighton and SECOR.

Calculations based on compounds with concentrations above the CRDL only.



**TABLE 7-1  
GRENADE RANGE GROUNDWATER QUALITY DATA**

**Fiscal Year 2003**

	GR1-1	GR1-2	GR2-1	GR2-1D	GR-DF1	Background <sup>(1)</sup>
	19-Jun-03	19-Jun-03	19-Jun-03	19-Jun-03	19-Jun-03	
<b>SVOCs (ug/l)</b>						
Bis (2-ethylhexyl) phthalate	<5.0	<5.0	<5.0	<4.9	<4.8	
<b>PCBs (ug/L)</b>						
PCB-1016	<0.1	<0.1	0.106	0.114	<0.1	
PCB-1221	<0.2	<0.2	<0.2	<0.2	<0.2	
PCB-1232	<0.1	<0.1	<0.1	<0.1	<0.1	
PCB-1242	<0.1	<0.1	<0.1	<0.1	<0.1	
PCB-1248	<0.1	<0.1	<0.1	<0.1	<0.1	
PCB-1254	<0.1	<0.1	<0.1	<0.1	<0.1	
PCB-1260	<0.1	<0.1	<0.1	<0.1	<0.1	
<b>Metals (ug/l)</b>						
Aluminum	B 6.8 (UB18)	B 8.4 (UB18)	<30.0	B 6.4 (UB18)	B 20. (UB18)	500
Arsenic	<3.00				<3.00	4
Barium	37	17	98	95	27	372
Beryllium	<2.00	<2.00	<2.00	<2.00	<2.00	1
Cadmium	<2.00	<2.00	<2.00	<2.00	B 0.11 (UB0.3)	4
Chromium	B 0.49	B 0.47	B 0.63	<5.00	B 0.66	5
Cobalt	B 0.60	B 1.3	B 1.1	B 0.84	B 0.17 (UB0.07)	1
Lead	B 0.16 (UB0.5)	B 0.17 (UB0.5)	B 0.14 (UB0.5)	B 0.15 (UB0.5)	B 0.094 (UB0.5)	7
Nickel	9.6	19	15	10	6	4
Silver	<5.00	<5.00	<5.00	<5.00	<5.00	4
Thallium	<2.00	<2.00	B 0.096 (UB0.05)	<2.00	B 0.043 (UB0.05)	2
Vanadium	B 1.3	<5.00	B 0.31	<5.00	B 0.81	17
Zinc	19 (UB13)	B 2.7 (UB13)	<5.00	<5.00	B 3.8 (UB13)	19
<b>Radionuclides (pCi/L)</b>						
Gross alpha	<4.0	<4.0	<4.0	<4.0	<4.0	20
Gross beta	<6.0	7.3 (UB2.4)	5.1 (UB2.4)	<6.0	<6.0	29.5
Radium 226	<0.6	<0.6	<0.6	<0.6	<0.6	(Not Listed)
Radium 228	<3.1	<3.1	<3.1	<3.3	<3.2	(Not Listed)

**Notes:**

<sup>(1)</sup> The background values were cited in Table 3 of the Grenade Range Engineering Evaluation / Cost Analysis Report.

Shaded results indicate detection of the analyte (note that data qualified "UB" is considered non detect).

D = Duplicate sample.

B = The value is below the reporting level, but above the method detection limit. Results should be considered estimated.

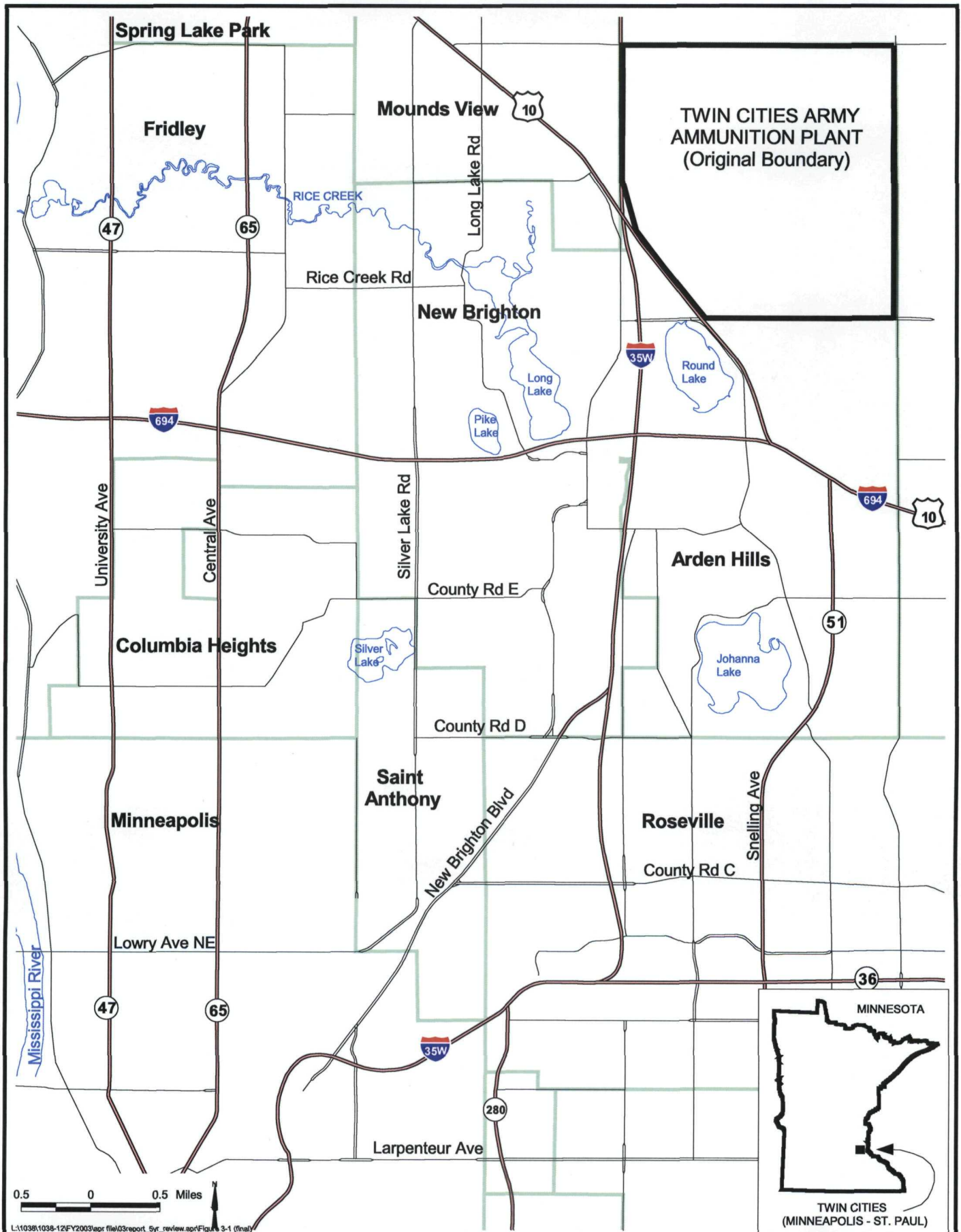
UB = The sample result was less than 5 times the level detected in a blank (the result for the blank is listed after "UB").

The sample result can be considered non detect at an elevated detection limit.

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## Figures

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TWIN CITIES ARMY AMMUNITION PLANT

Site Location Map

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**Wenck**


Wenck Associates, Inc. 1800 Pioneer Creek Center  
Environmental Engineers Maple Plain, MN 55359-0249

SEPT 2004

Figure 3-1





 Original TCAAP Boundary

750 0 750 1500 Feet

Notes:

1. Aerial Orthophotography flown in 2000  
L:\11038\11038-12\y03\apr file\03 report\_lucip\_5yr review.apr\Figure 3-2

TWIN CITIES ARMY AMMUNITION PLANT

Original TCAAP Boundary

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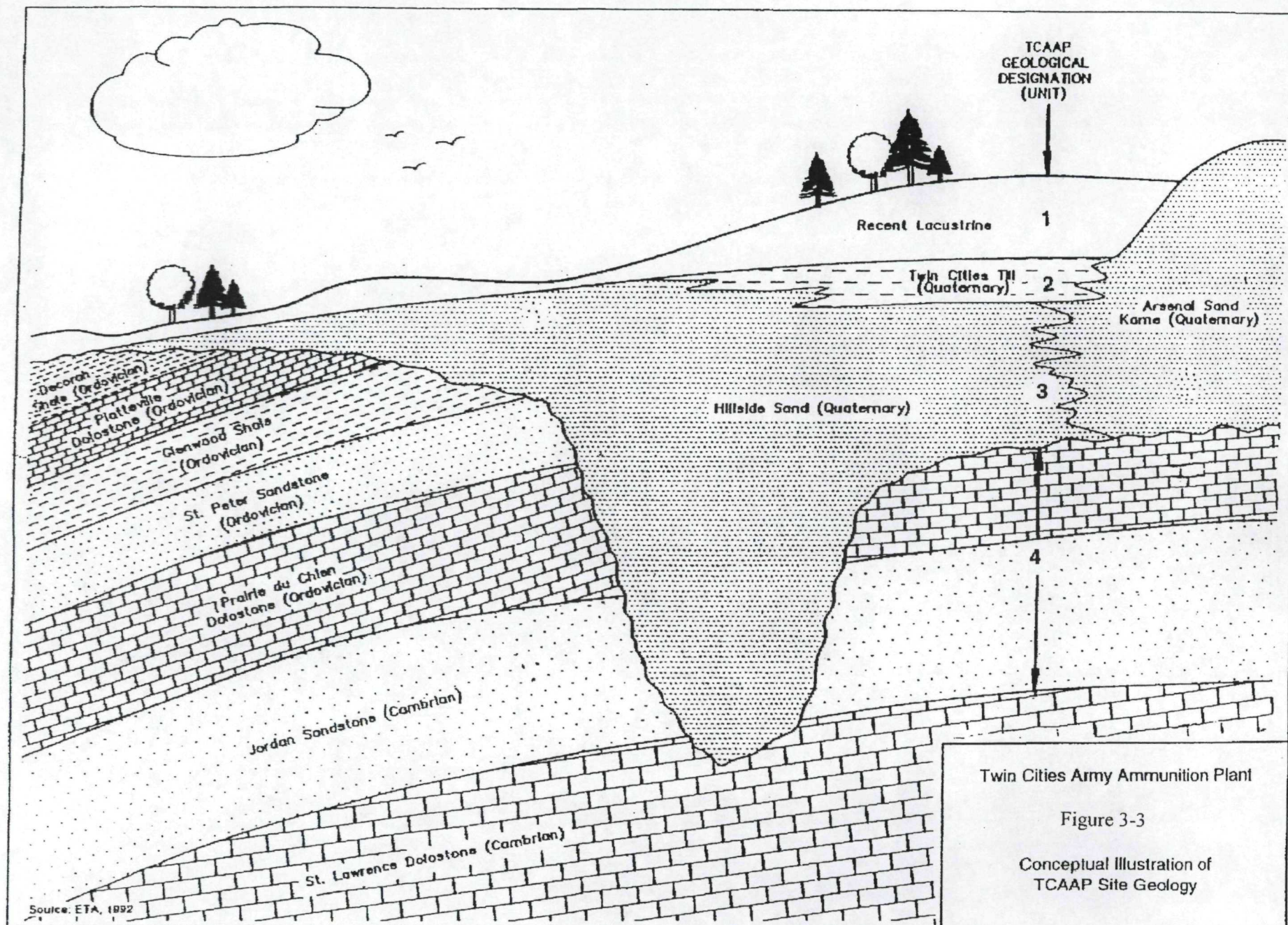
**Wenck**

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Figure 3-2



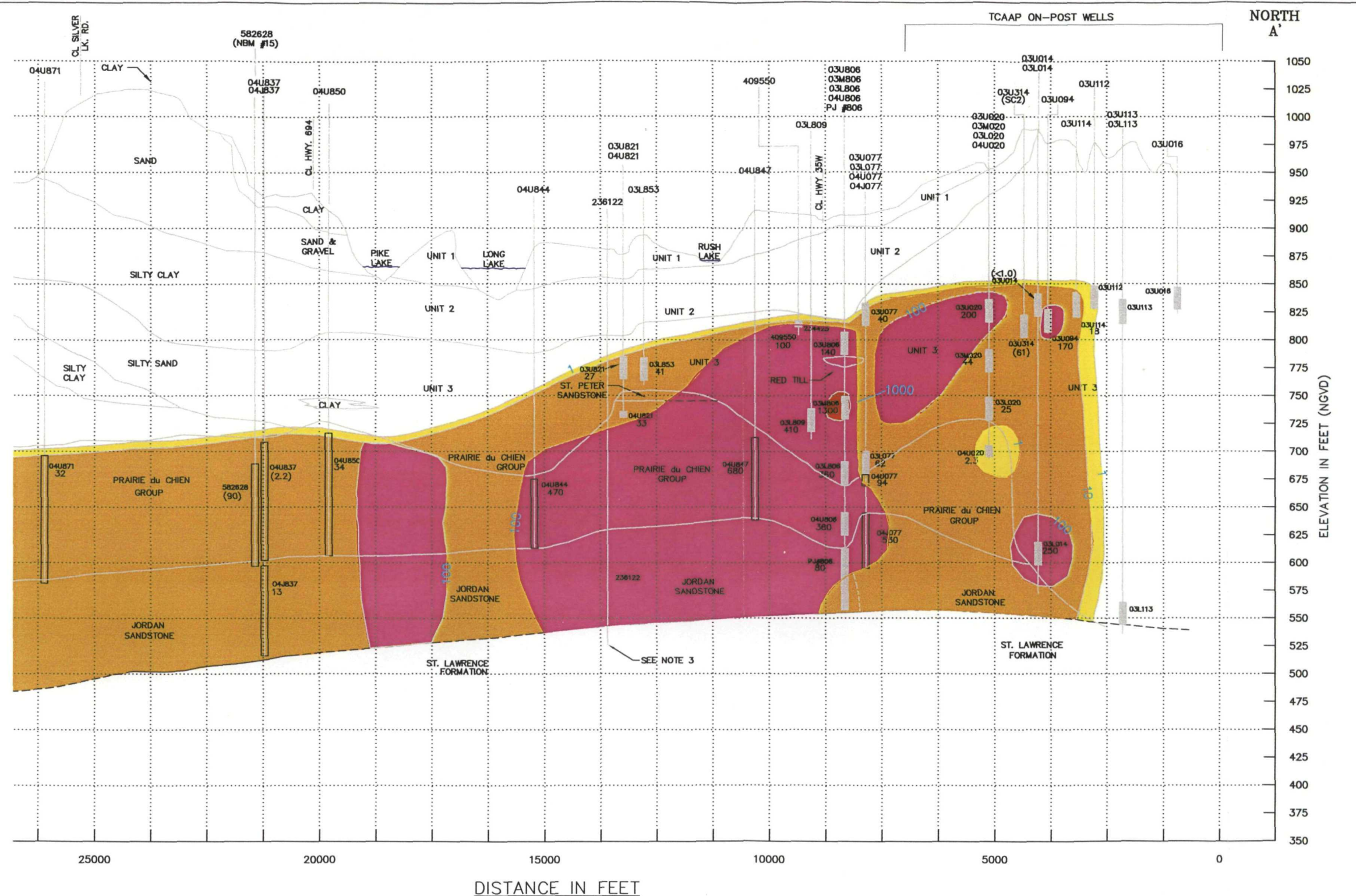


Twin Cities Army Ammunition Plant

Figure 3-3

Conceptual Illustration of  
TCAAP Site Geology





#### NOTES

- (1) CROSS SECTION: TOPOGRAPHY CONSTRUCTED WITH DATA FROM U.S.G.S. NEW BRIGHTON 7.5 MINUTE SERIES QUAD MAP DATED 1967 (PHOTOREVISED 1972, AND 1980); WELL LOCATIONS AND THE "LINE" OF SECTION ARE SHOWN ON FIGURES 3-5 THROUGH 3-7.
- (2) WELL NESTS, CONSISTING OF INDIVIDUAL WELLS IN THE SAME PROXIMITY, ARE REPRESENTED ON THE CROSS SECTION BY A SINGLE LINE WITH MULTIPLE WELL SCREENS
- (3) WELL 236122 HAS BEEN SEALED, BUT IS SHOWN SINCE IT WAS USED TO PREPARE THE CROSS SECTION

#### DISTANCE IN FEET

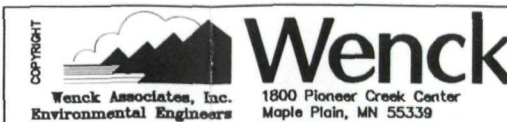
#### LEGEND

- |  |   |  |  |
|--|---|--|--|
|  | GEOLOGIC CONTACT  |  | 10 ISOCONCENTRATION CONTOUR (ug/l)   |
|  | INFERRED GEOLOGIC CONTACT                                     |  | 10 ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)   |
|  | SCREENED INTERVAL OF WELL                                     |  | THE VALUE IS ESTIMATED BECAUSE THE VALUE IS BELOW THE REPORTING LIMIT, BUT ABOVE THE METHOD DETECTION LEVEL. |
|  | OPEN HOLE INTERVAL OF WELL                                    |  |  |
|  | TRICHLOROETHENE CONCENTRATION (ug/l)                          |  |  |
|  | (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES) |  |  |

M: /1038/ARDENHILLS/OCT-03/TCX\_A\_SOUTH.DWG

#### TWIN CITIES ARMY AMMUNITION PLANT

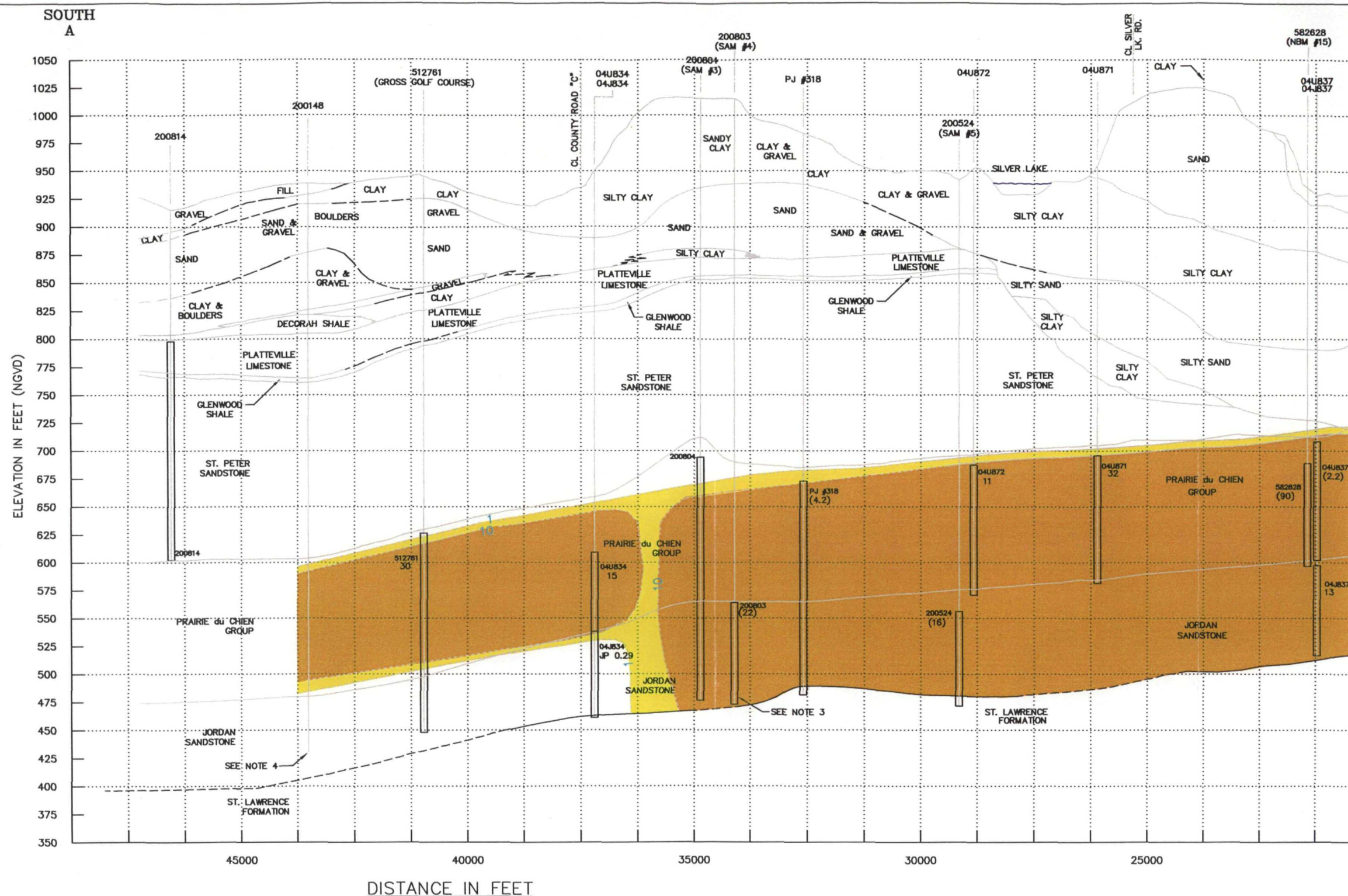
Cross-Section A-A' (North Half), Summer 2003



Sept. 2004

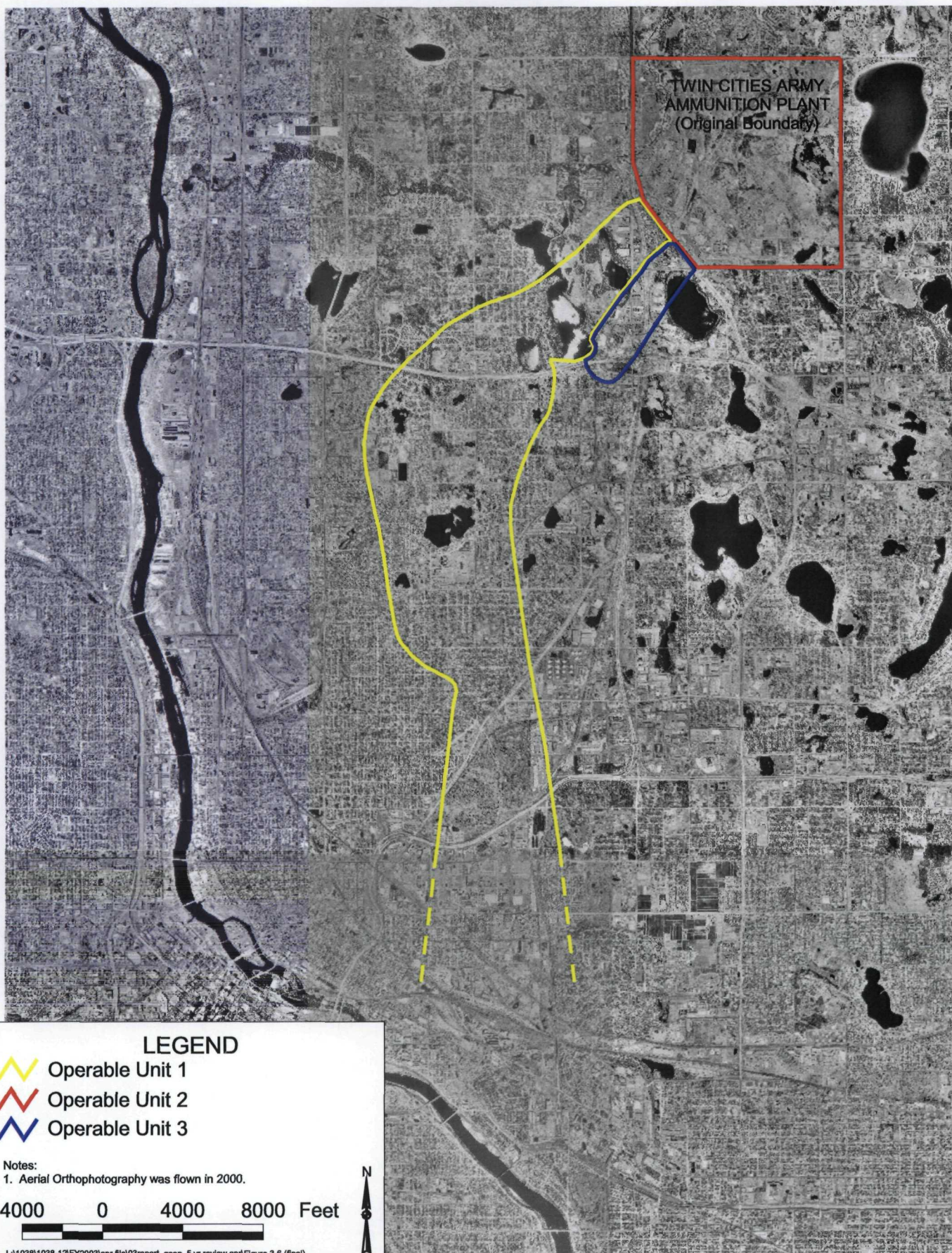
FIGURE 3-4





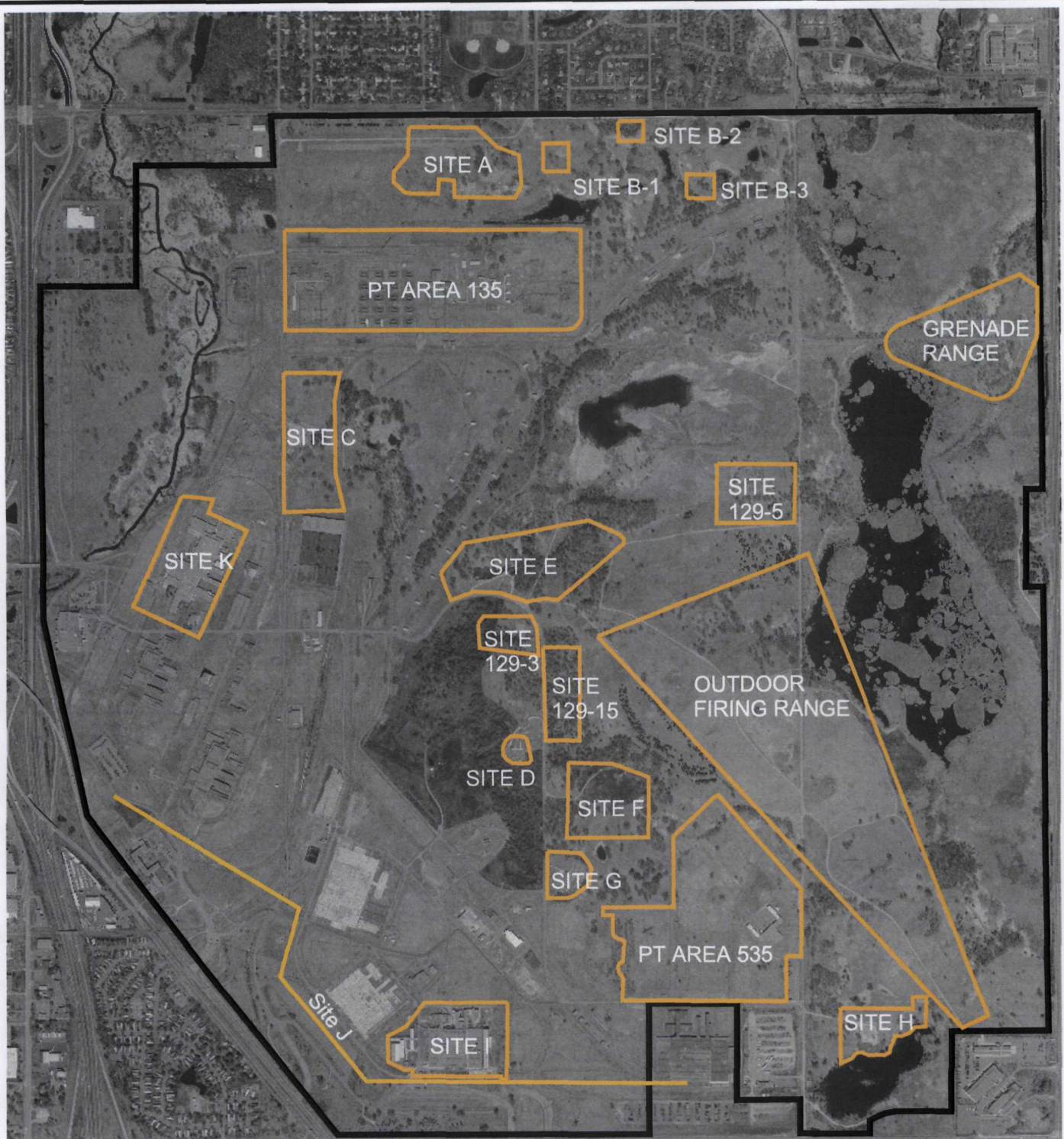
M: /1038/ARDENHILLS/OCT-03/TCX\_A\_SOUTH.DWG





**TWIN CITIES ARMY AMMUNITION PLANT**  
 Conceptual Illustration of TCAAP  
 Operable Units





 General NPL Site Boundary (See Note 1)

 Original TCAAP Boundary

750 0 750 1500 Feet



**Notes:**

1. General NPL site boundaries determined during the initial site investigations. Please refer to the latest site reports for the current boundary definitions.
2. Aerial Orthophotography flown in 2000.

L:\1038\1038-12\fy03\apr file\03 report\_lucip\_5 yr review.apr\Figure 3-7

**TWIN CITIES ARMY AMMUNITION PLANT**

**TCAAP Site Boundaries**

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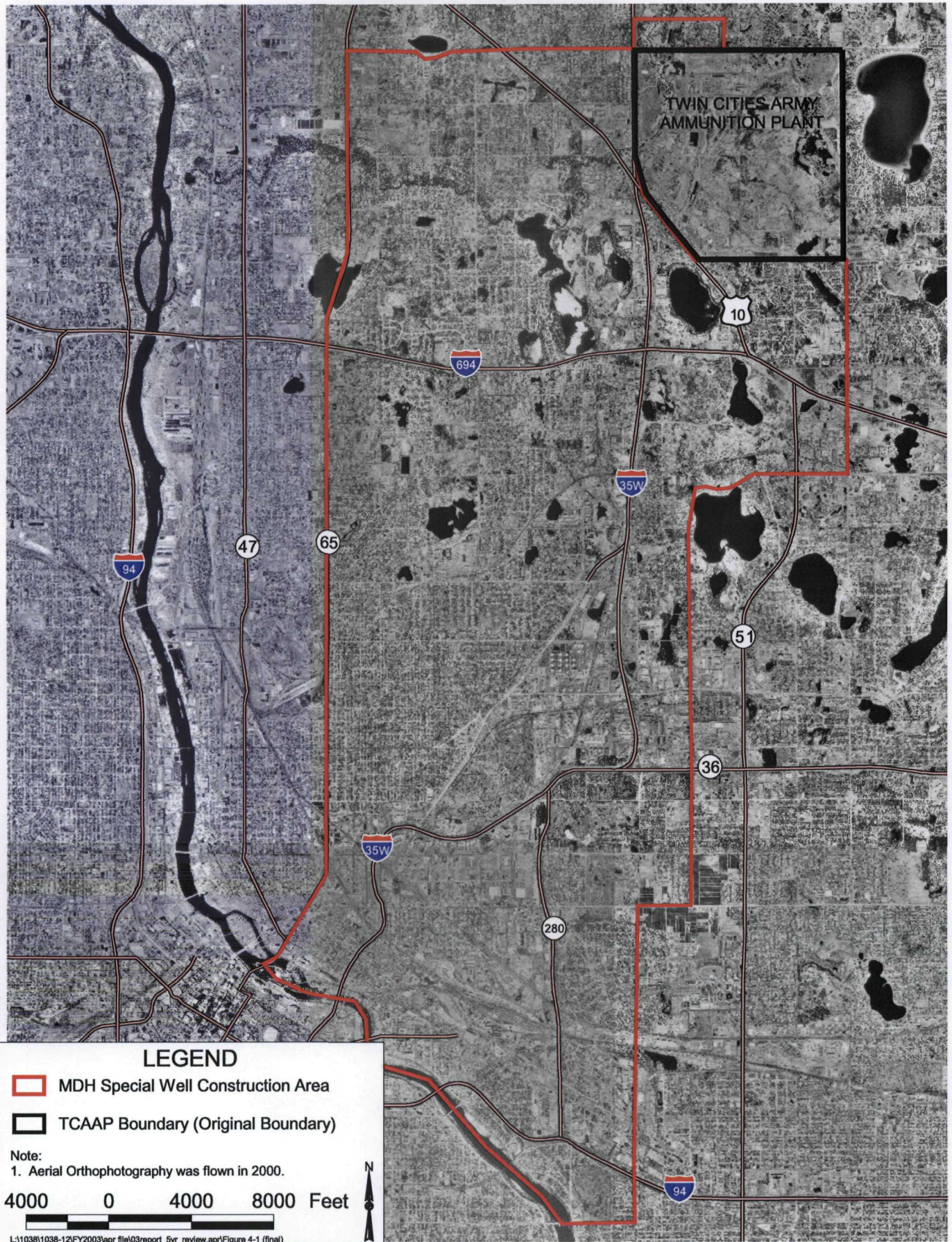
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**Figure 3-7**





TWIN CITIES ARMY AMMUNITION PLANT

Special Well Construction Area

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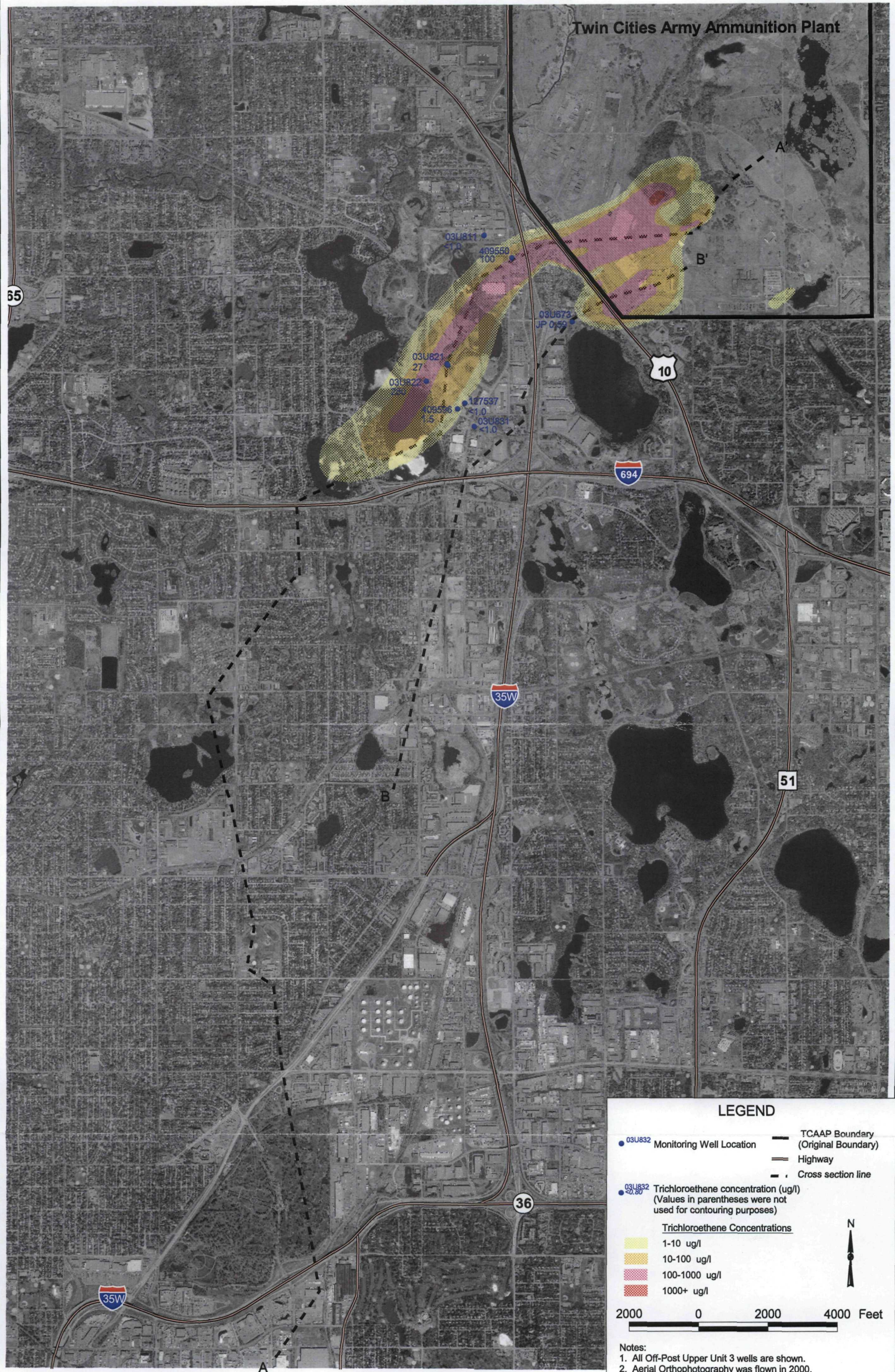
SEPT 2004

Figure 4-1









L:\1038\1038-12\FY2003\apr file\03report\_5yr\_review.apr\Figure 4-3 (final)

# TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Upper Unit 3, Trichloroethene Isoconcentration Map  
Summer 2003

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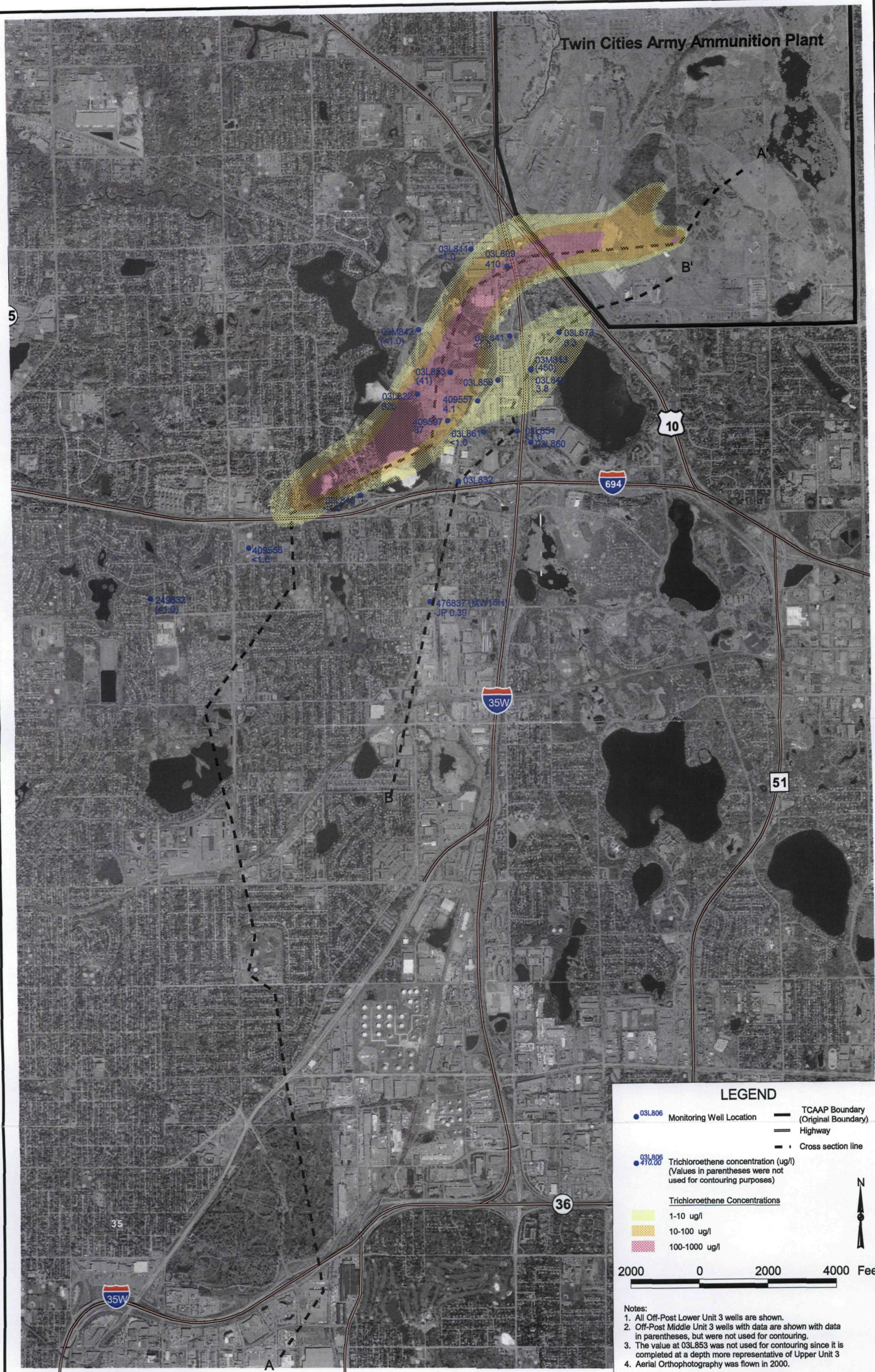
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Figure 4-3





L:\1038\1038-12\FY2003\april\03report\_5yr\_review.apr\Figure 4-4 (final)

# TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Lower Unit 3, Trichloroethene Isoconcentration Map  
Summer 2003

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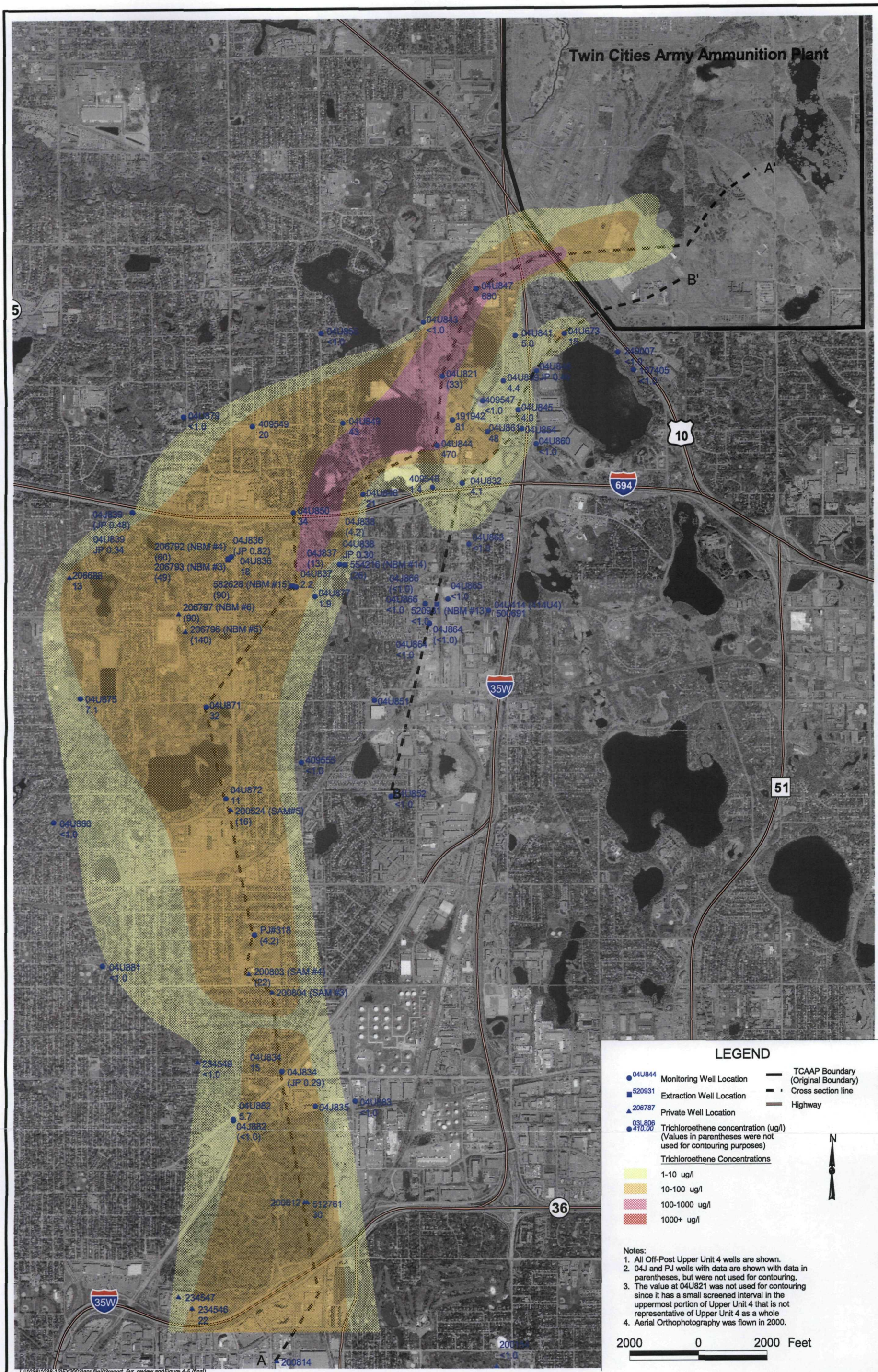
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Figure 4-4



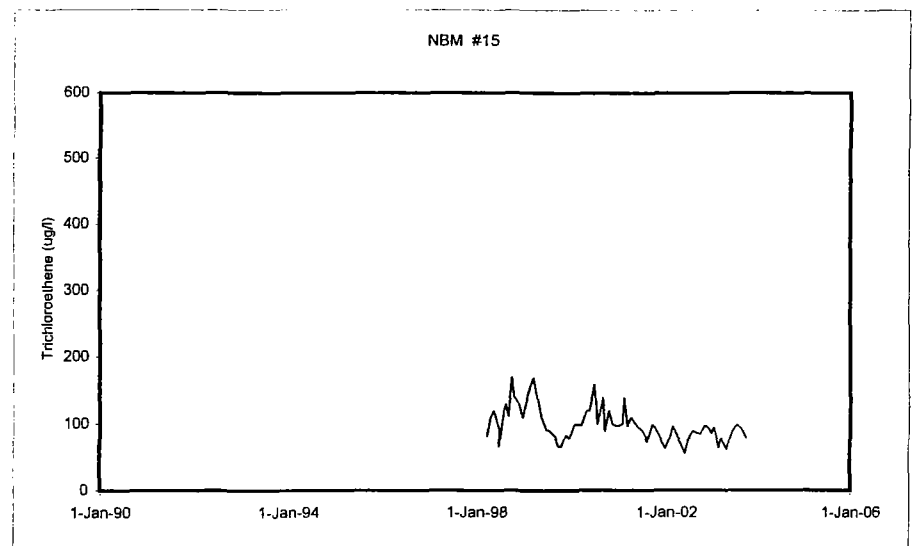
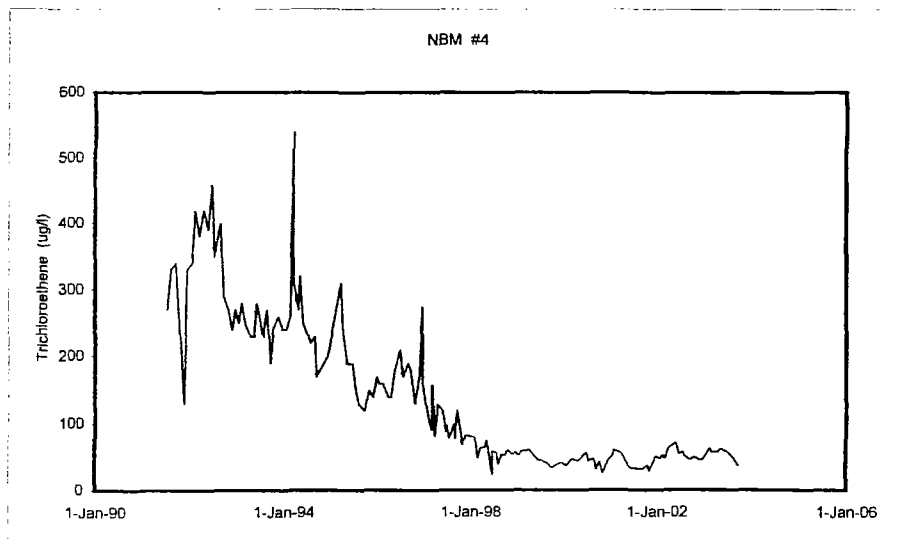
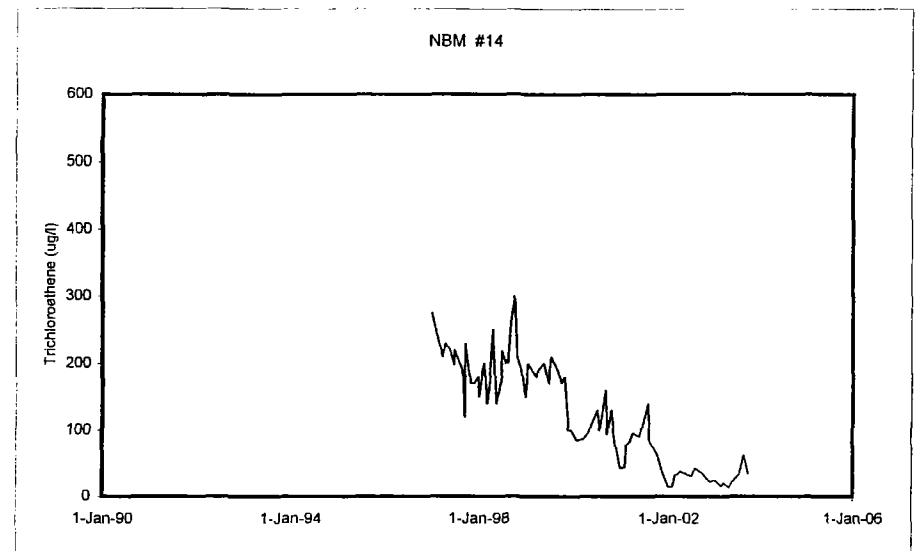
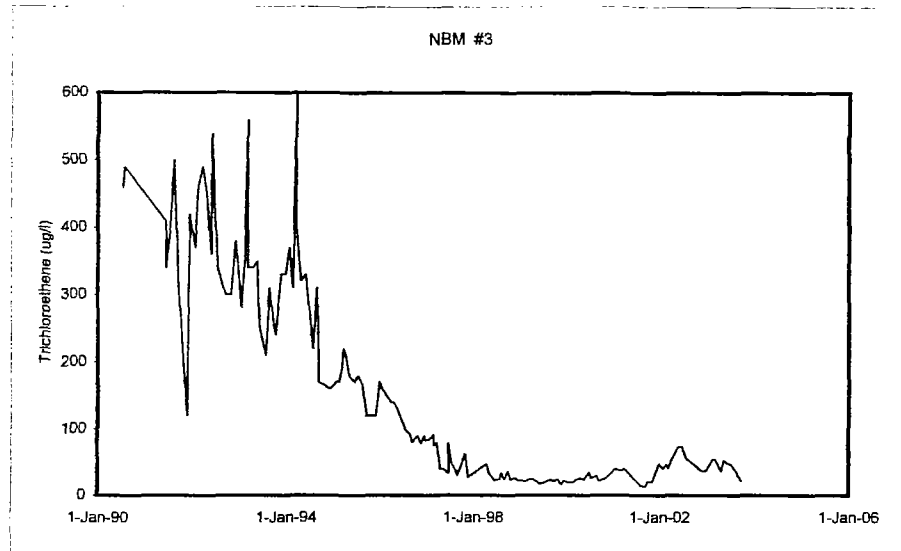


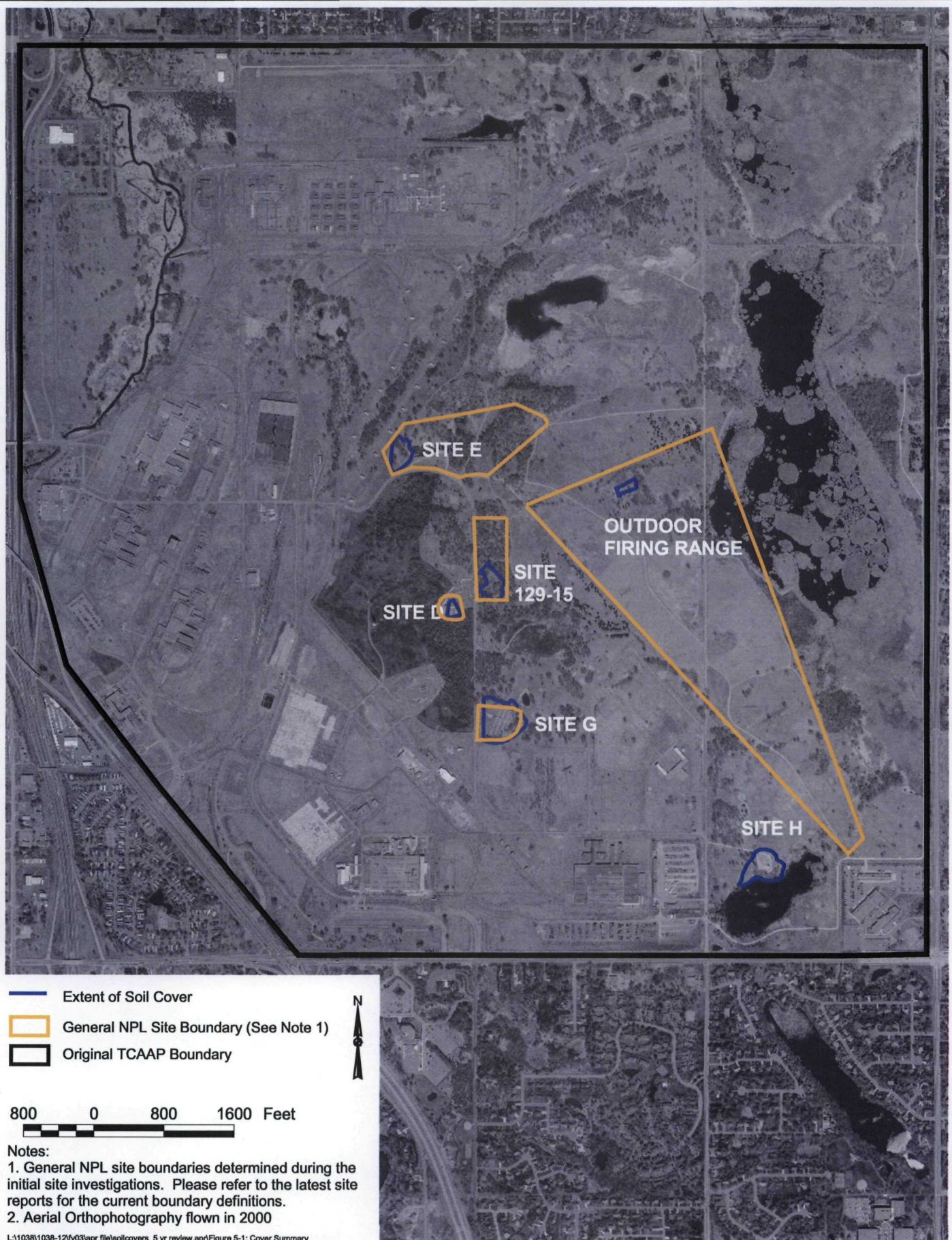
TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Upper Unit 4, Trichloroethene Isoconcentration Map Summer 2003



FIGURE 4-6  
NEW BRIGHTON MUNICIPAL WELLS: TRICHLOROETHENE WATER QUALITY TRENDS  
TWIN CITIES ARMY AMMUNITION PLANT





TWIN CITIES ARMY AMMUNITION PLANT

General Locations of Soil Covers

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Environmental Engineers

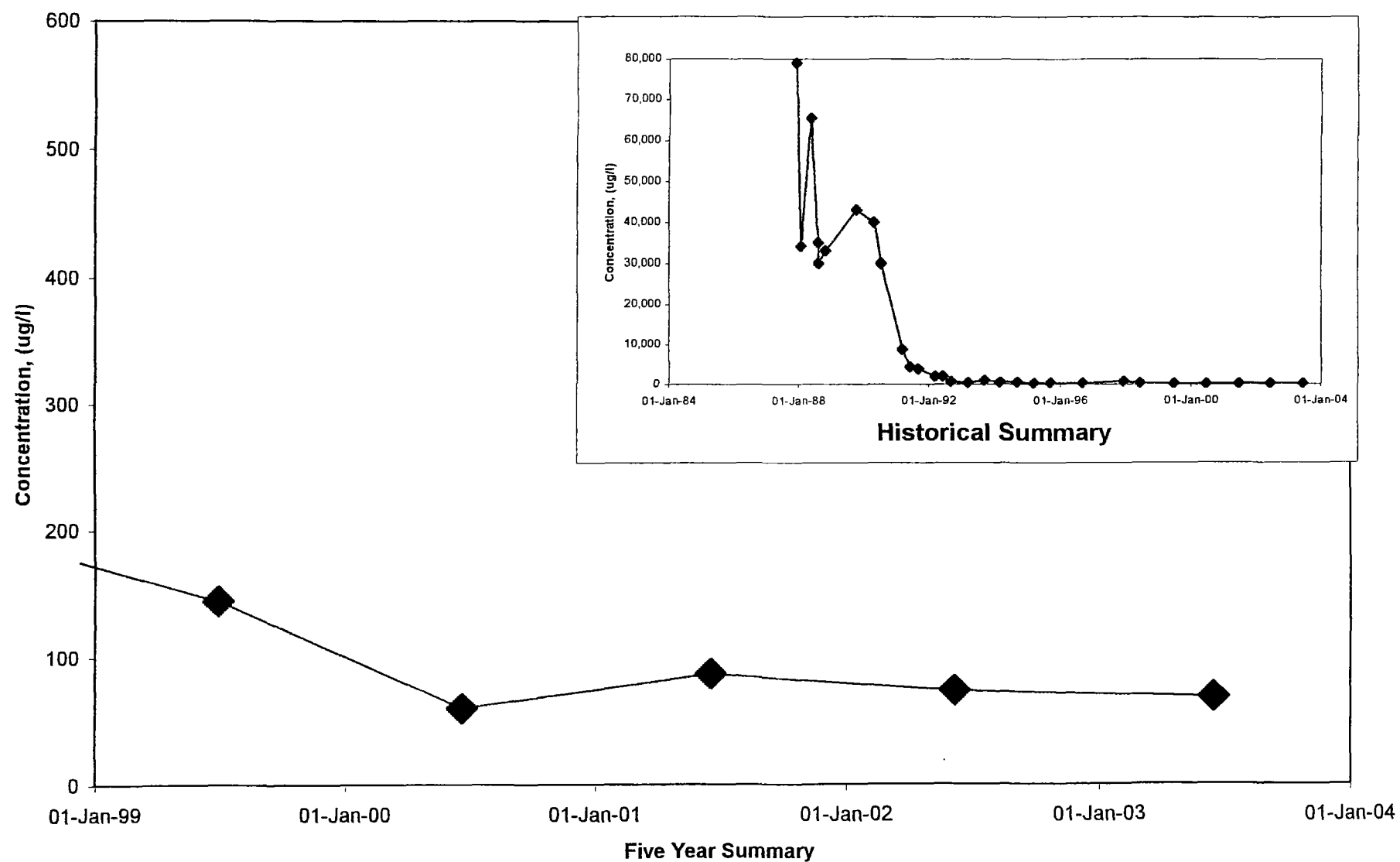
1800 Pioneer Creek Center  
Maple Plain, MN 55359-0249

SEPT 2004

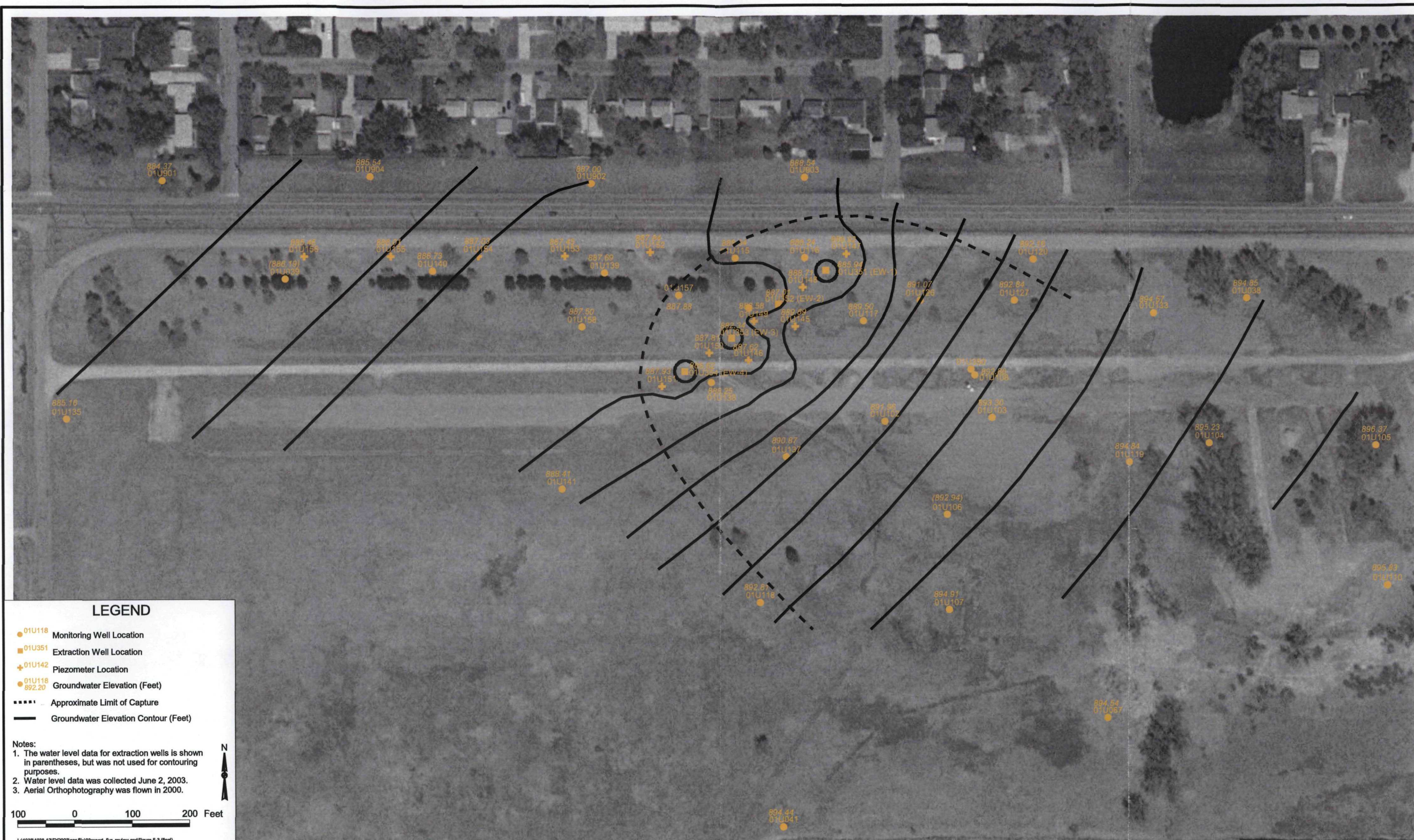
Figure 5-1



**FIGURE 5-2**  
**SITE D, WELL 03U093, TRICHLOROETHENE WATER QUALITY TREND**  
**TWIN CITIES ARMY AMMUNITION PLANT**





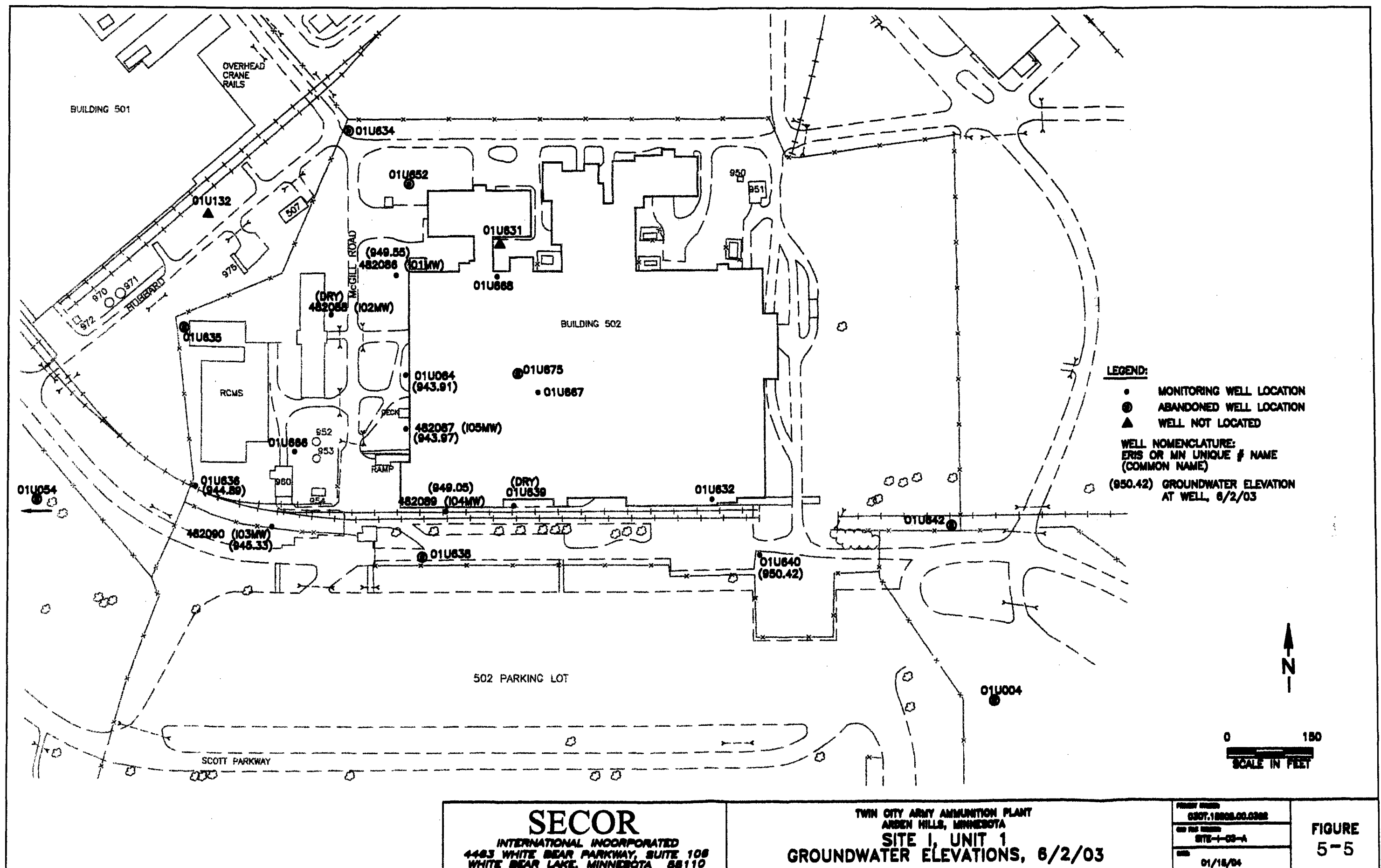


TWIN CITIES ARMY AMMUNITION PLANT  
Site A, Unit 1, Potentiometric Map -- Summer 2003







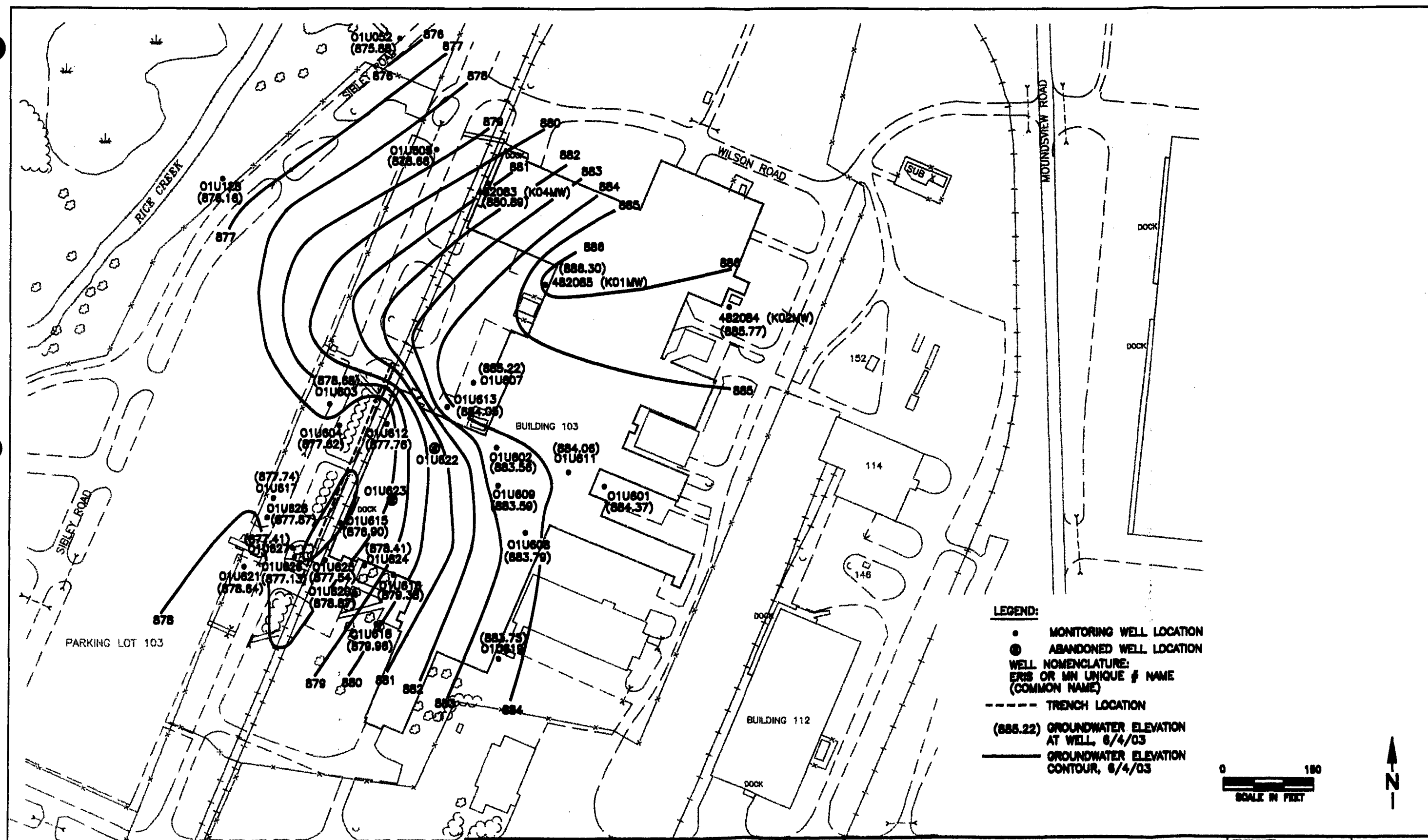


**SECOR**  
 INTERNATIONAL INCORPORATED  
 4463 WHITE BEAR PARKWAY, SUITE 108  
 WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITION PLANT  
 ARDEN HILLS, MINNESOTA  
**SITE 1, UNIT 1**  
 GROUNDWATER ELEVATIONS, 6/2/03

PROJECT NUMBER  
 0307.18908.00.0302  
 OLD FILE NUMBER  
 SITE-1-03-A  
 DATE  
 01/18/04

**FIGURE**  
**5-5**

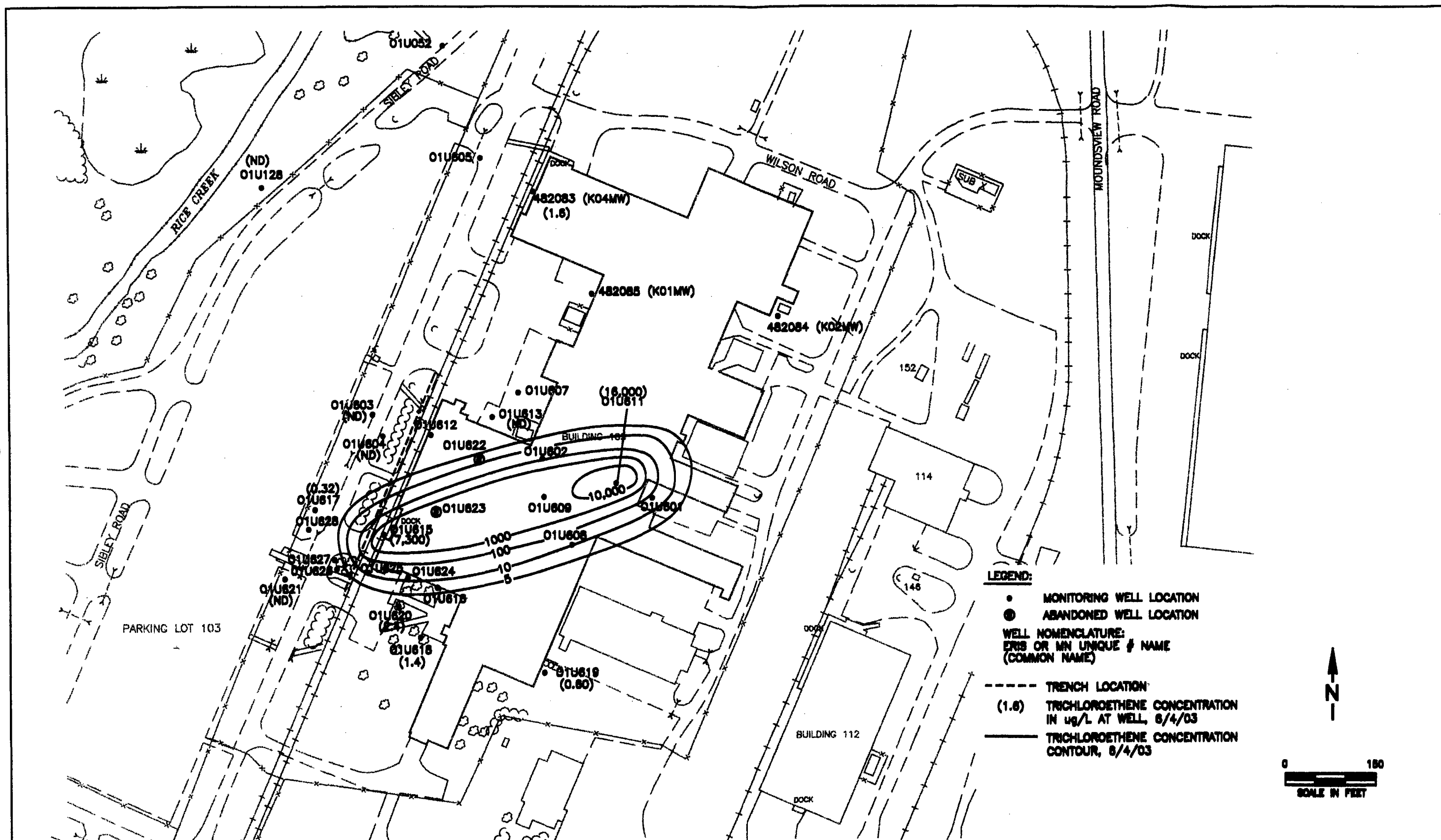


**SECOR**  
INTERNATIONAL INCORPORATED  
4483 WHITE BEAR PARKWAY, SUITE 108  
WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITION PLANT  
ARDEN HILLS, MINNESOTA  
**SITE K, UNIT 1**  
**POTENTIOMETRIC MAP, 6/4/03 (Q79)**

PROJECT NUMBER  
024.12808.00.00488  
JOB FILE NUMBER  
SITE-K-QW-03  
DATE  
12/31/03

**FIGURE**  
**5 - 6**

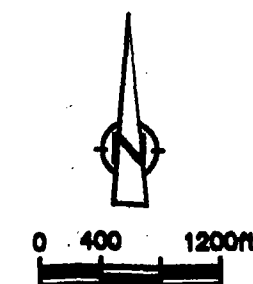
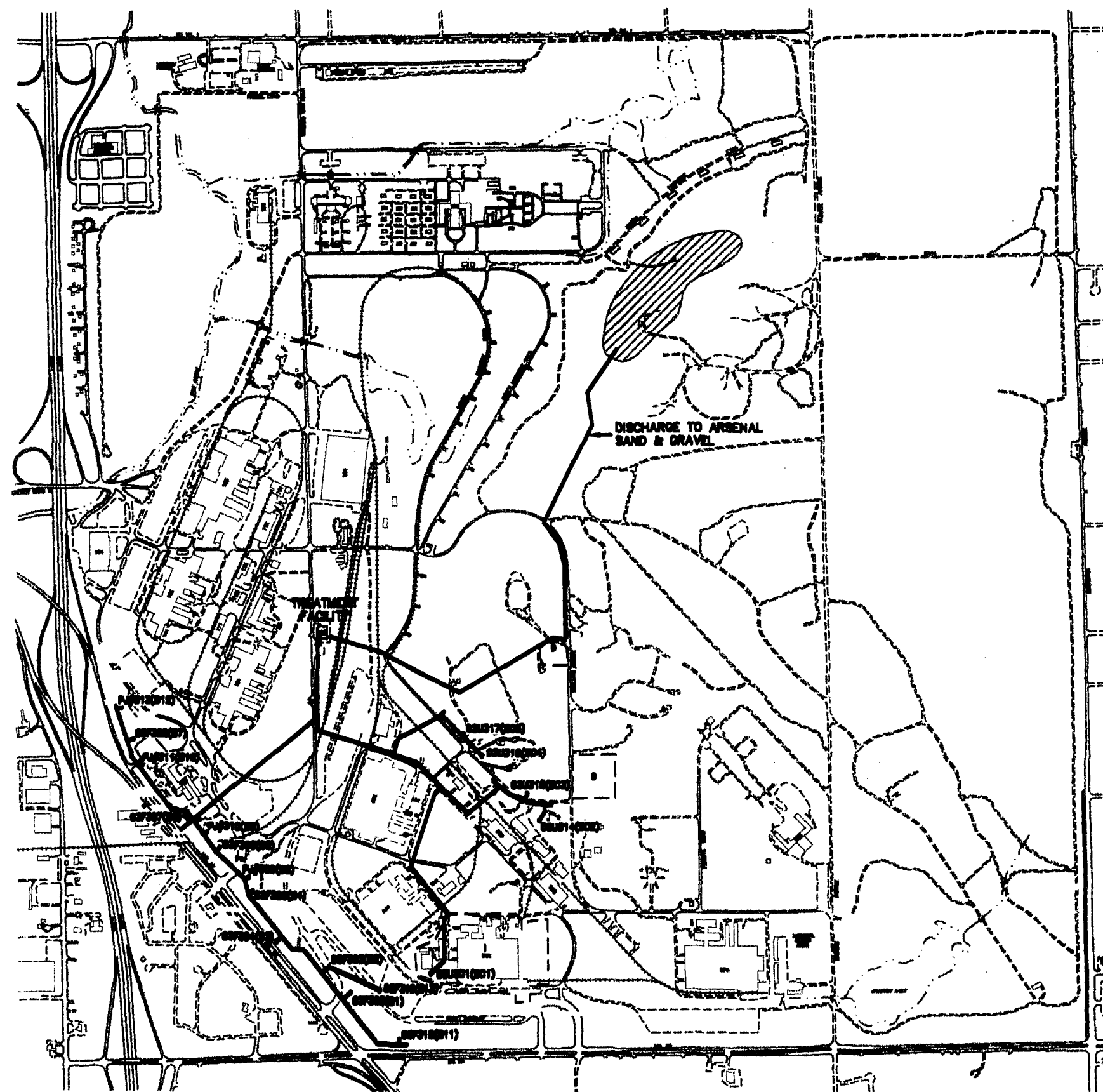


**SECOR**  
INTERNATIONAL INCORPORATED  
4463 WHITE BEAR PARKWAY, SUITE 108  
WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITION PLANT  
ARSENAL HILLS, MINNESOTA  
**SITE K, UNIT 1**  
**TRICHLOROETHENE CONCENTRATION MAP,**  
**6/4/03 (Q79)**

PROJECT NUMBER  
6907.10002.00.00482  
OF THE NUMBER  
SITE-K-TCE-Q3  
DATE  
12/31/03

**FIGURE**  
**5 - 7**



- LEGEND**
- PRIMARY ROAD
  - SECONDARY ROAD
  - RAILROAD
  - DRAINAGE
  - BUILDING
  - BUILDING REMOVED
  - SOURCE AREA
  - WELL LOCATION

**EXTRACTION WELL NAME CROSS REFERENCE**

B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJF309
B9	PJF310
B10	PJF311
B11	03F312
B12	PJF313
B13	03F319
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

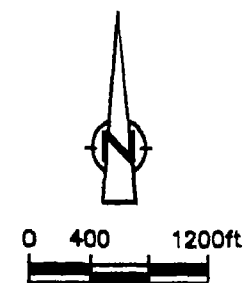
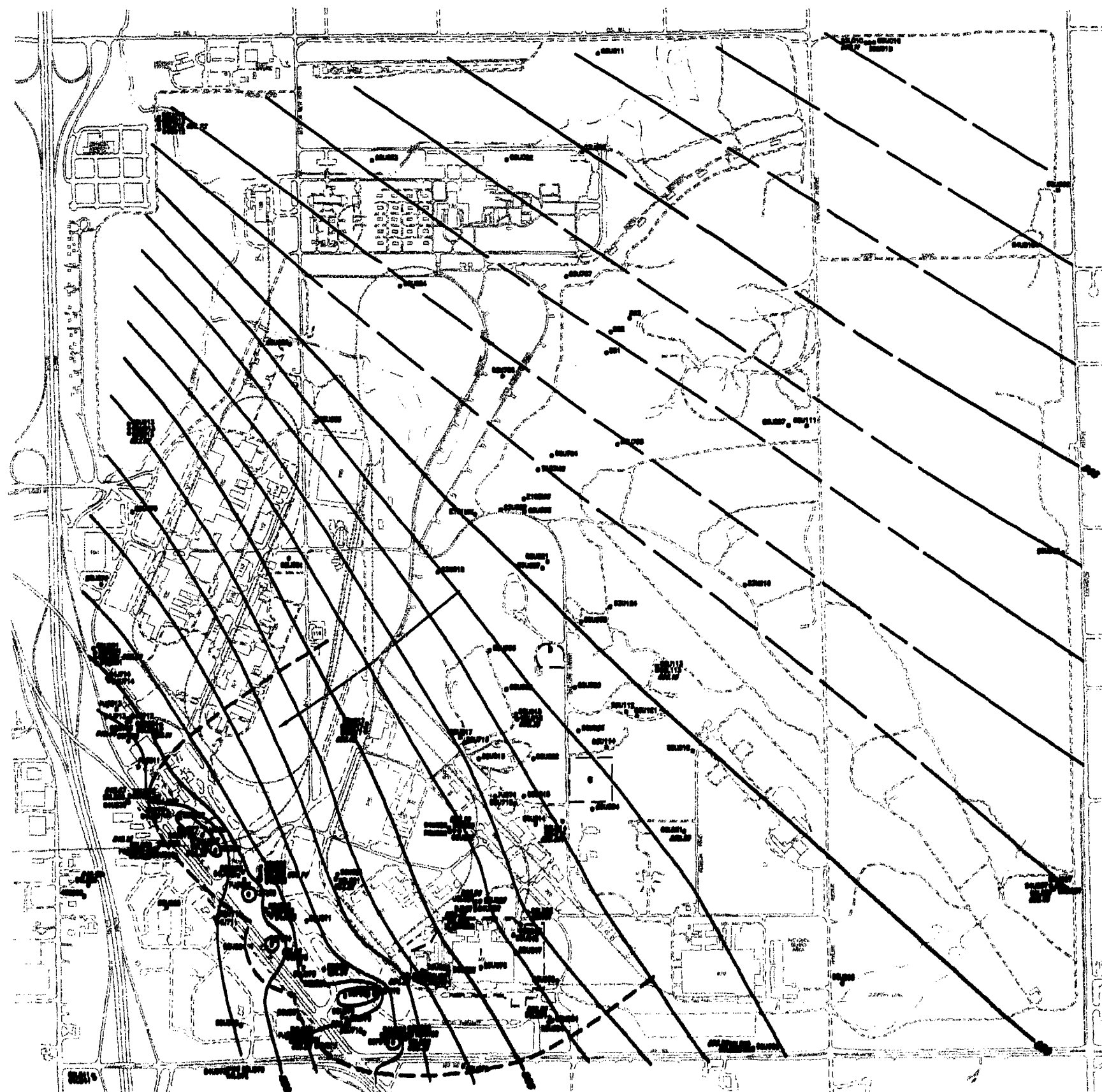
figure 5-8

**TGRS LAYOUT**  
*Twin Cities Army Ammunition Plant*

**CRA**







#### LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- RAILROAD
- DRAINAGE
- BUILDING
- BUILDING REMOVED
- SOURCE AREA
- WELL LOCATION
- 844.52 GROUNDWATER ELEVATION IN FEET AMSL
- GROUNDWATER CONTOUR
- DIRECTION OF GROUNDWATER FLOW
- LIMIT OF CAPTURE
- NOTE: GROUNDWATER CONTOURS ARE INTERPOLATED FROM THE DATA POINTS SHOWN.
- NA NOT AVAILABLE
- GROUNDWATER ELEVATION NOT USED IN CONTOURING
- ARSENAL SAND AND GRAVEL PIT TREATED WATER DISCHARGE AREA. (APPROXIMATE BOUNDARIES)

#### EXTRACTION WELL NAME CROSS REFERENCE

B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJ#309
B9	PJ#310
B10	PJ#311
B11	03F312
B12	PJ#313
B13	03F319
SC1	03U301
SC2	03U314
SC3	03U316
SC4	03U318
SC5	03U317

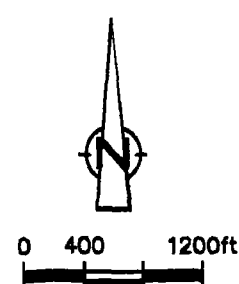
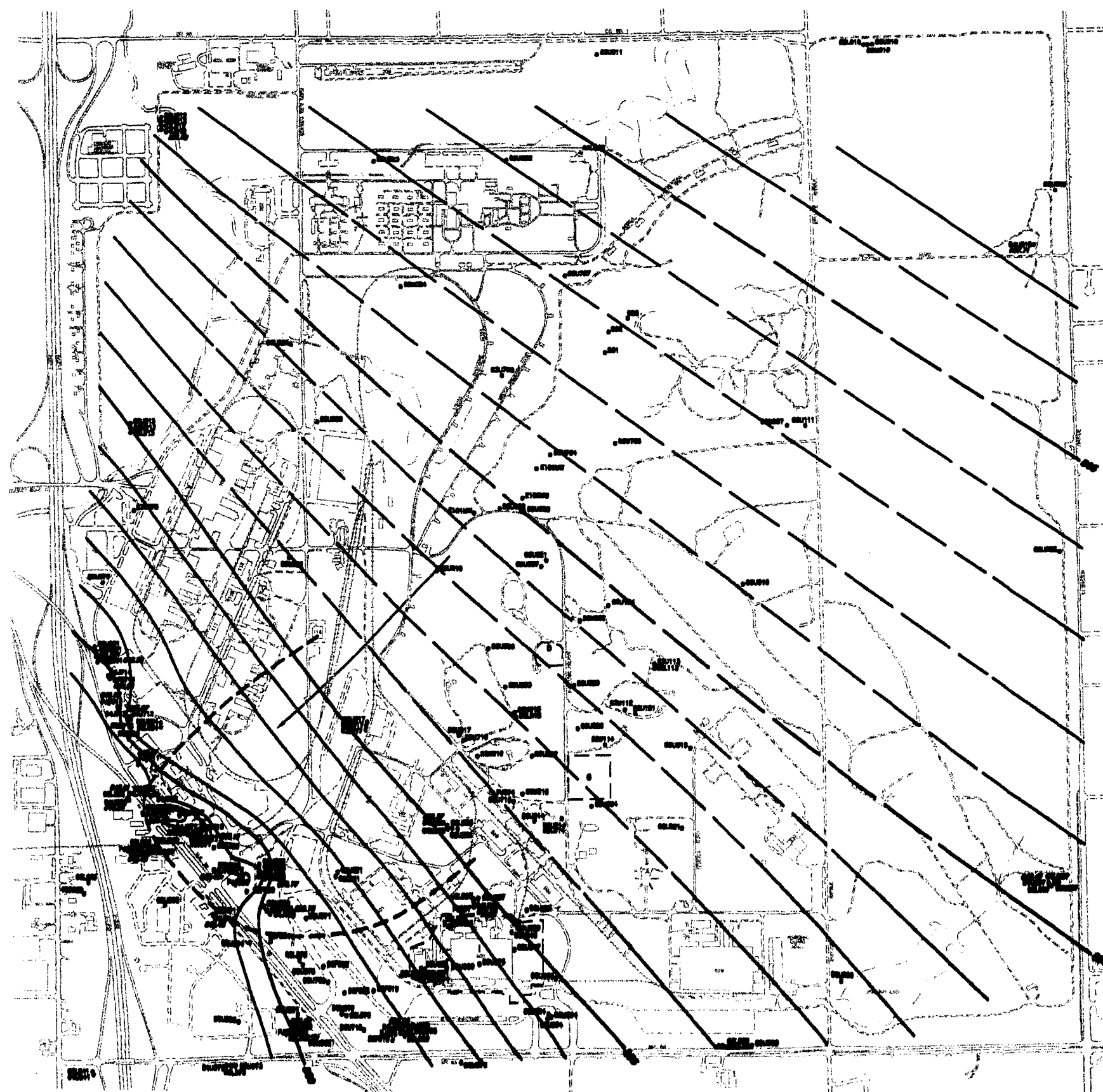
figure 5-10

OU2, LOWER UNIT 3,  
POTENTIOMETRIC MAP,  
6/9/03 (Q79)

*Twin Cities Army Ammunition Plant*

CRA

31783-43(004)GN-SP005 JAN 09/2004



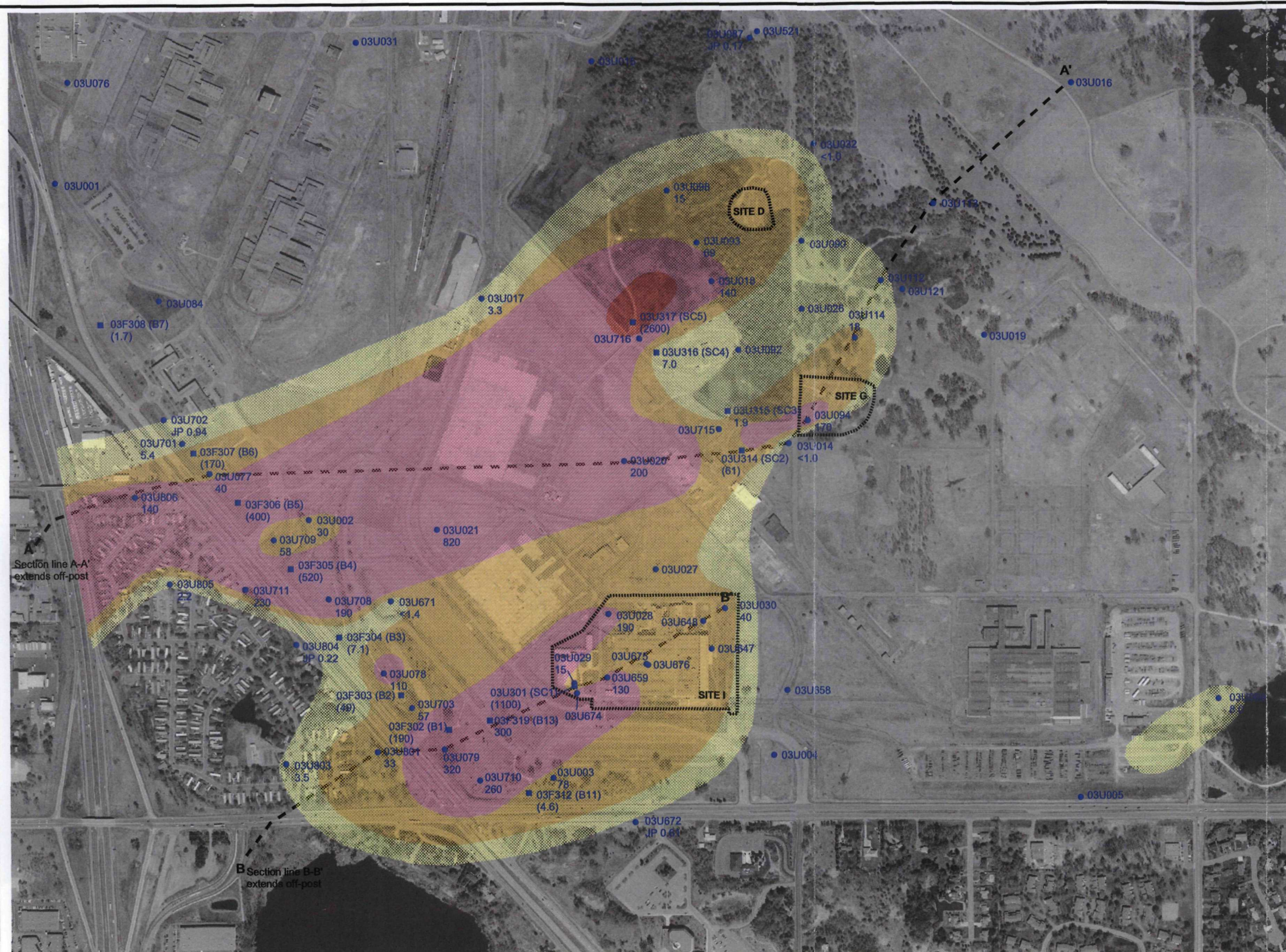
- LEGEND**
- PRIMARY ROAD
  - SECONDARY ROAD
  - RAILROAD
  - DRAINAGE
  - BUILDING
  - BUILDING REMOVED
  - SOURCE AREA
  - WELL LOCATION
  - 844.52 GROUNDWATER ELEVATION IN FEET AMSL
  - GROUNDWATER CONTOUR
  - DIRECTION OF GROUNDWATER FLOW
  - LIMIT OF CAPTURE
  - NOTE: GROUNDWATER CONTOURS ARE INTERPOLATED FROM THE DATA POINTS SHOWN.
  - NA NOT AVAILABLE
  - GROUNDWATER ELEVATION NOT USED IN CONTOURING
  - ARSENAL SAND AND GRAVEL PIT TREATED WATER DISCHARGE AREA (APPROXIMATE BOUNDARIES)

**EXTRACTION WELL NAME CROSS REFERENCE**

B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJ#309
B9	PJ#310
B10	PJ#311
B11	03F312
B12	PJ#313
B13	03F319
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

figure 5-11  
 OU2, UPPER UNIT 4,  
 POTENTIOMETRIC MAP,  
 6/9/03 (Q79)  
 Twin Cities Army Ammunition Plant





# LEGEND

- 03U096 Monitoring Well Location
- 03U315 Extraction Well Location
- 03U096 15 Trichloroethene concentration (ug/l)  
(values in parentheses were not used for contouring purposes)
- Site Boundary
- - - Cross-Section Line
- Trichloroethene Concentrations
- 1-10 ug/l
- 10-100 ug/l
- 100-1000 ug/l
- 1000+ ug/l

## Notes:

1. 03F and 03U extraction wells are shown with data in parentheses, but concentrations were not used for contouring (except for SC-3 and SC-4, which were used for contouring since they are being sampled as monitoring wells and since they are screened only within Upper Unit 3.)
2. Aerial Orthophotography was flown in 2000.
3. Results are from groundwater samples collected between June 10 and 23, 2003.

700 0 700 Feet

L:\1038\1038-12\FY2003\april\03report\_5yr\_review.apr\Figure 5-12 (final)

## TWIN CITIES ARMY AMMUNITION PLANT

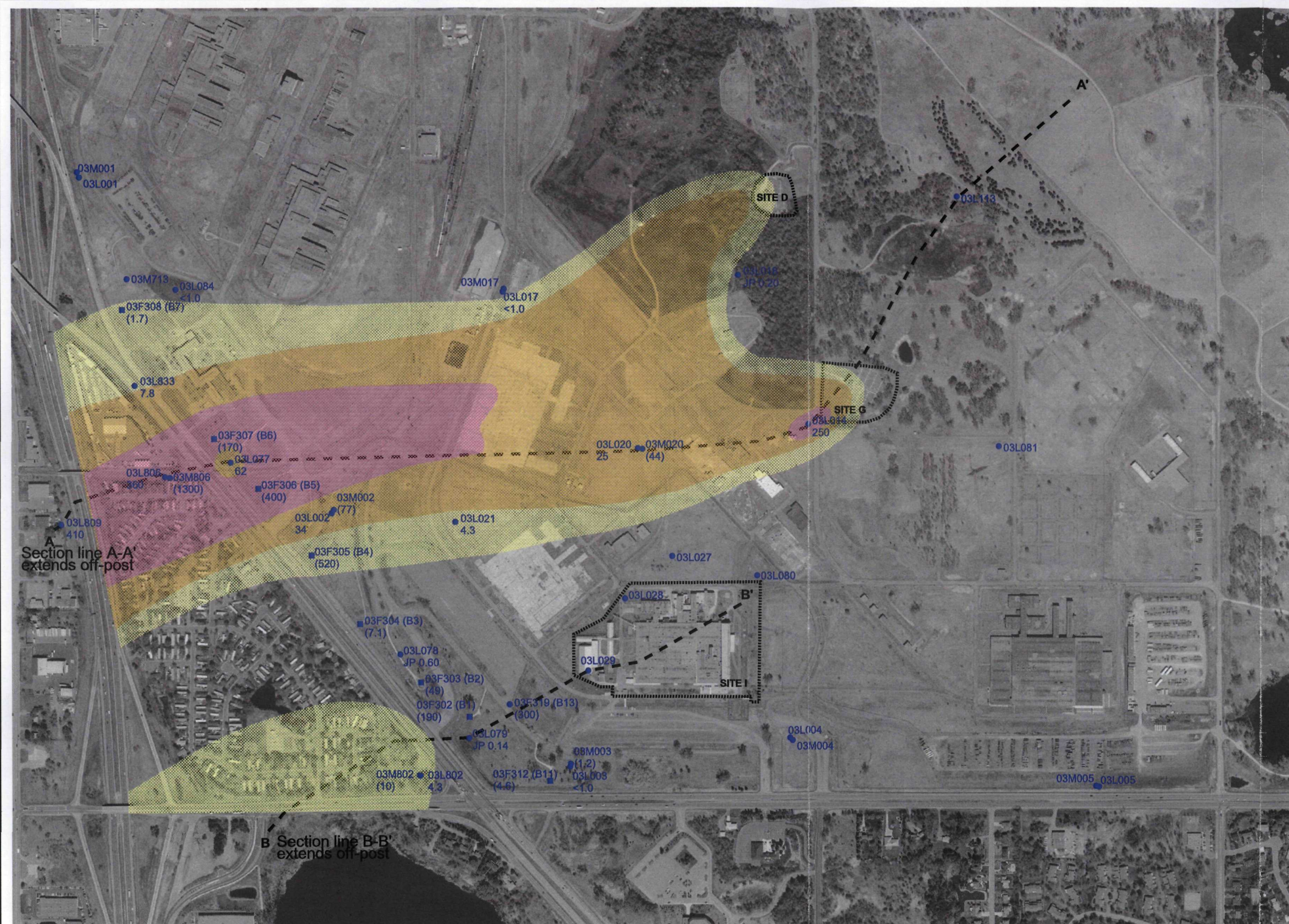
OU2, Upper Unit 3, Trichloroethene Isoconcentration Map, Summer 2003

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Environmental Engineers Maple Plain, MN 55359-0249

SEPT 2004

Figure 5-12





# LEGEND

- 03L077 Monitoring Well Location
- 03F307 Extraction Well Location
- 03L077 62 Trichloroethene concentration (ug/l)  
(values in parentheses were not used for contouring purposes)
- ..... Site Boundary
- - - Cross-Section Line
- Trichloroethene Concentrations
- 1-10 ug/l
- 10-100 ug/l
- 100-1000 ug/l
- 1000+ ug/l

- Notes:
1. Middle Unit 3 wells with data are shown with data in parentheses, but were not used for contouring.
  2. 03F extraction wells are shown with data in parentheses, but were not used for contouring.
  3. Aerial Orthophotography was flown in 2000.
  4. Results are from groundwater samples collected between June 10 and 23, 2003.



700 0 700 Feet

L:\1038\1038-12\FY2003\april\03report\_5yr\_review.apr\Figure 5-13 (final)

## TWIN CITIES ARMY AMMUNITION PLANT

OU2, Lower Unit 3, Trichloroethene Isoconcentration Map, Summer 2003

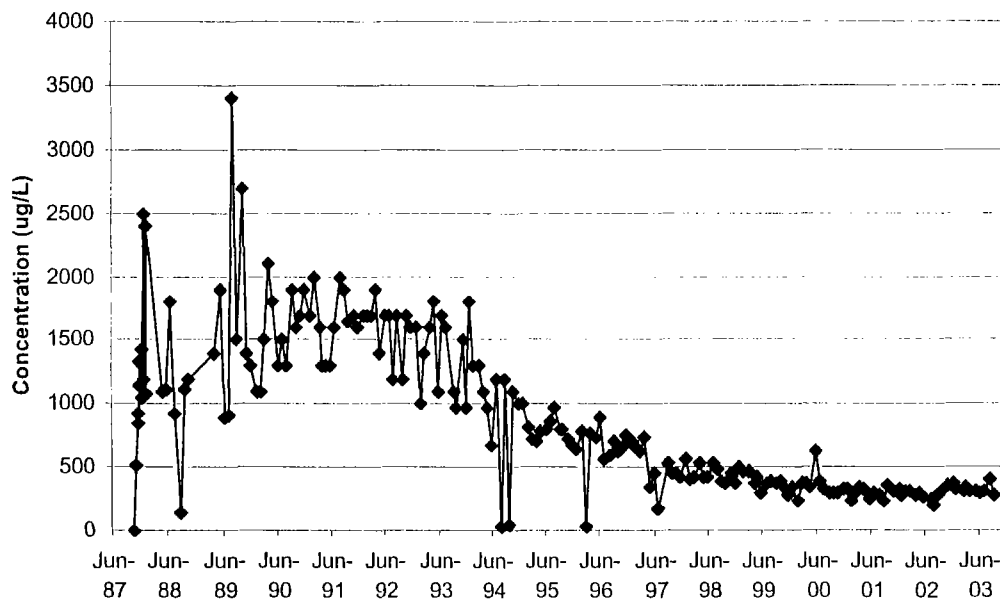
Wenck  
Wenck Associates, Inc. 1800 Pioneer Creek Center  
Environmental Engineers Maple Plain, MN 55359-0249

SEPT 2004

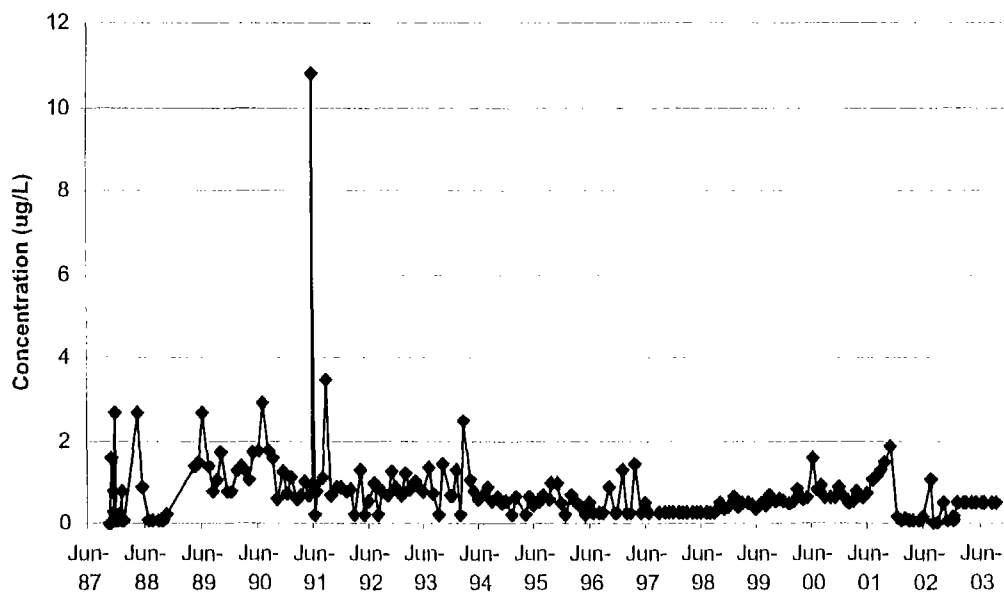
Figure 5-13



TRCLE vs. TIME  
TGRS INFLUENT



TRCLE vs. TIME  
TGRS EFFLUENT



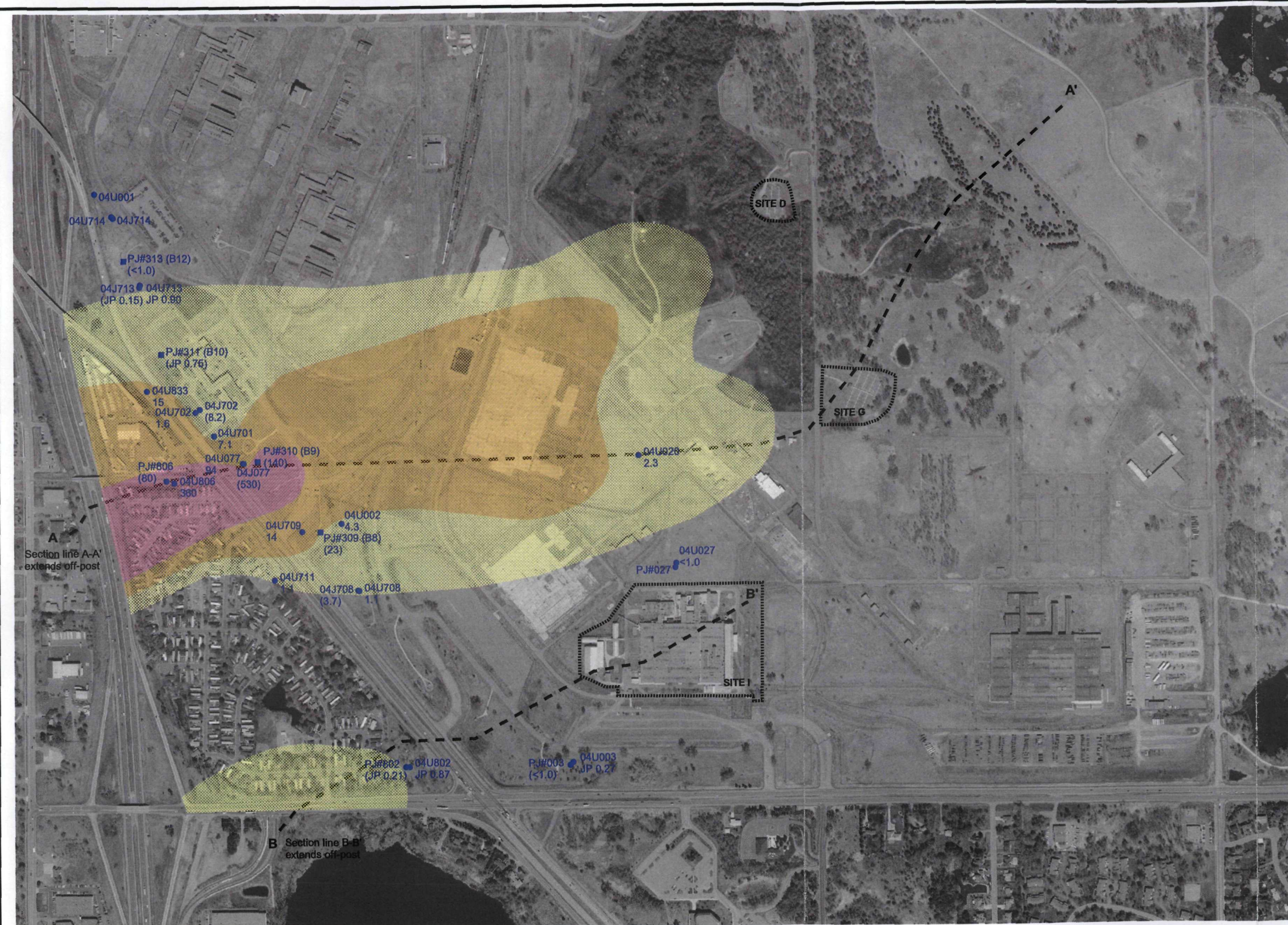
NOTE: SAMPLES REPORTING CONCENTRATIONS LESS THAN THE DETECTION LIMIT WERE PLOTTED AS HALF THE DETECTION LIMIT. WHEN DUPLICATE SAMPLES WERE COLLECTED, THE HIGHER CONCENTRATION WAS PLOTTED.

figure 5-15

TGRS TREATMENT SYSTEM PERFORMANCE  
*Twin Cities Army Ammunition Plant*

**CRA**





# LEGEND

- 04U020 Monitoring Well Location
- PJ#309 Extraction Well Location
- 04U020 2.3 Trichloroethene concentration (ug/l)  
(values in parentheses were not used for contouring purposes)
- Site Boundary
- - - Cross-Section Line
- Trichloroethene Concentrations
- 1-10 ug/l
- 10-100 ug/l
- 100-1000 ug/l
- 1000+ ug/l

- Notes:
1. All 04J wells (Jordan Wells) with data are shown with data in parentheses, but were not used for contouring.
  2. All PJ# Extraction wells are shown with data in parentheses, but were not used for contouring.
  3. PJ# Monitoring wells with data are shown with data in parentheses, but were not used for contouring.
  4. Aerial Orthophotography was flown in 2000.
  5. Results are from groundwater samples collected between June 10 and 23, 2003.



700 0 700 Feet

L:\1038\1038-12\FY2003\april\03report\_5yr\_review.apr\Figure 5-14 (final)

## TWIN CITIES ARMY AMMUNITION PLANT

OU2, Upper Unit 4, Trichloroethene Isoconcentration Map, Summer 2003

compart



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Figure 5-14





 General NPL Site Boundary (See Note 1)

 Original TCAAP Boundary

 Monitoring Well

750 0 750 1500 Feet

**Notes:**

1. General NPL site boundaries determined during the initial site investigations. Please refer to the latest site reports for the current boundary definitions.
2. Aerial Orthophotography flown in 2000.

L:\1038\1038-12\FY03\apr file\03report\_lucip\_5\_yr review.apr\Figure 5-16

**TWIN CITIES ARMY AMMUNITION PLANT**

**Well Locations for Shallow Soil Site Monitoring**

copyright

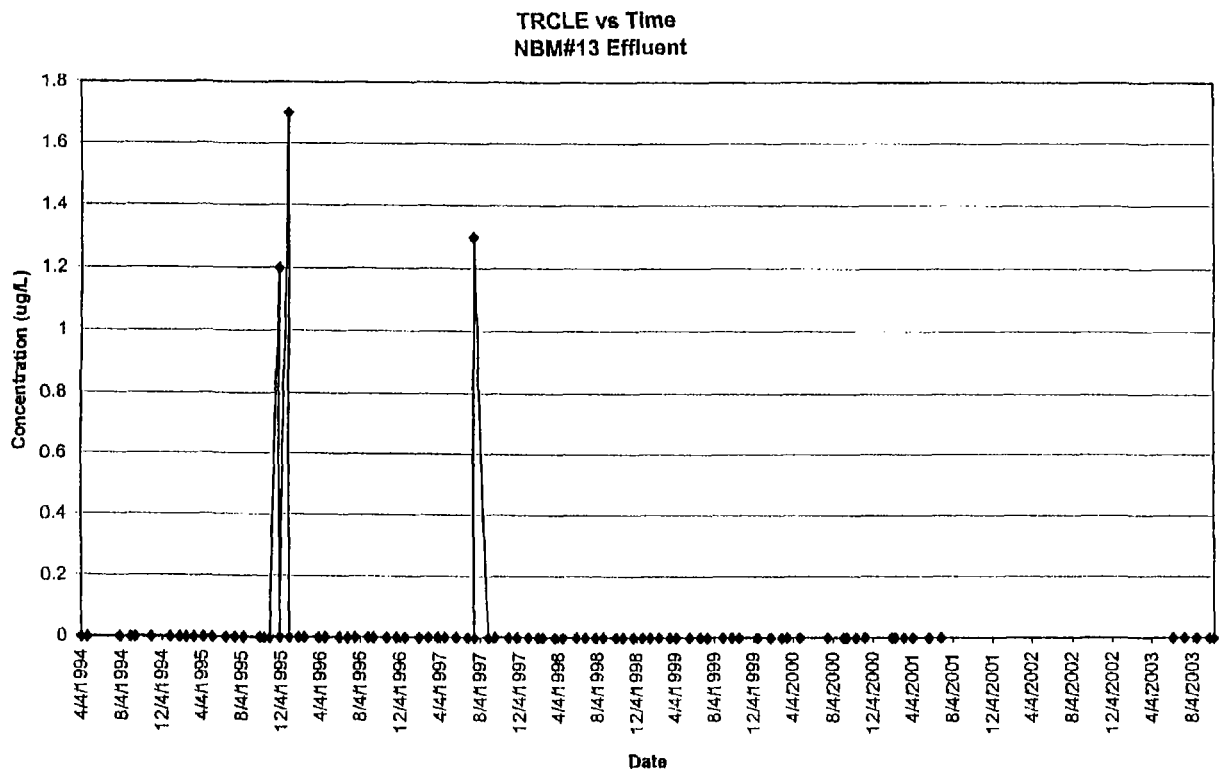
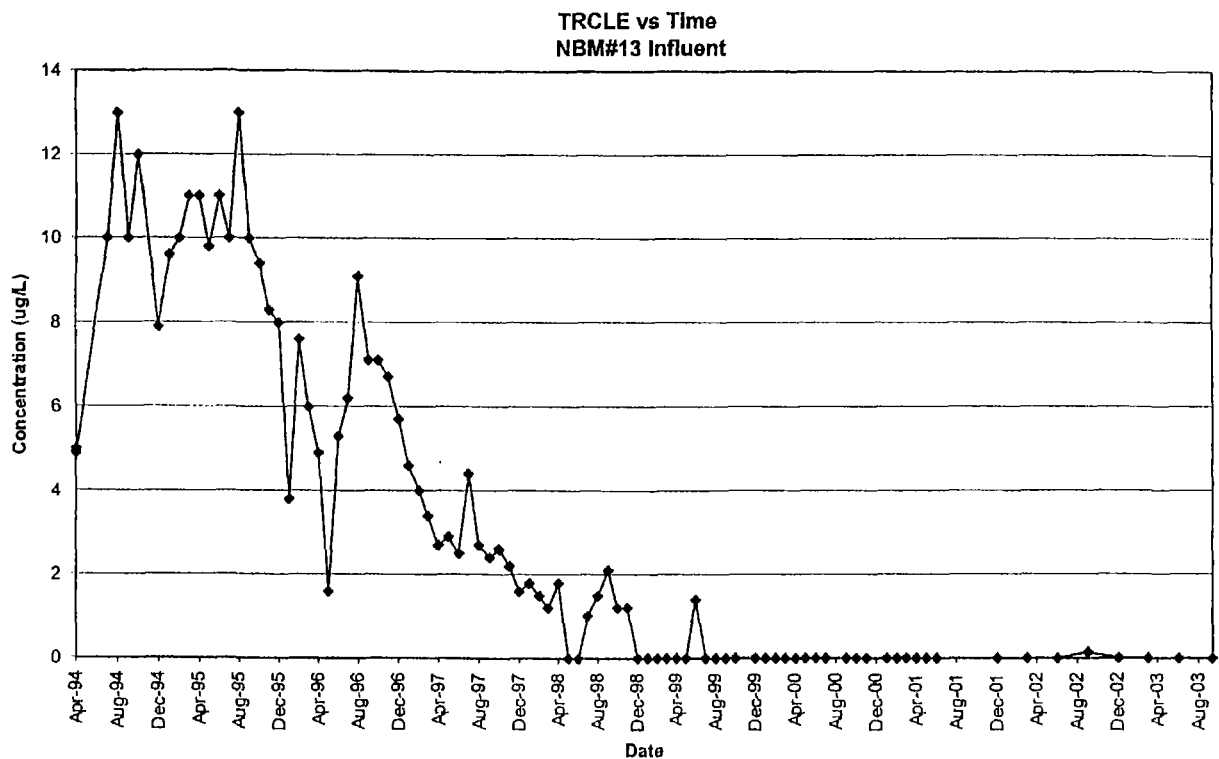


**Wenck**

Wenck Associates, Inc. 1800 Pioneer Creek Center  
Environmental Engineers Maple Plain, MN 55359-0249

**SEPT 2004**

**Figure 5-16**



**SECOR**

INTERNATIONAL INCORPORATED  
4463 WHITE BEAR PARKWAY, SUITE 106  
WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITIES ARMY AMMUNITION PLANT  
ARDEN HILLS, MINNESOTA

**OU3 (PGRS)**  
**TRCLE VS. TIME**

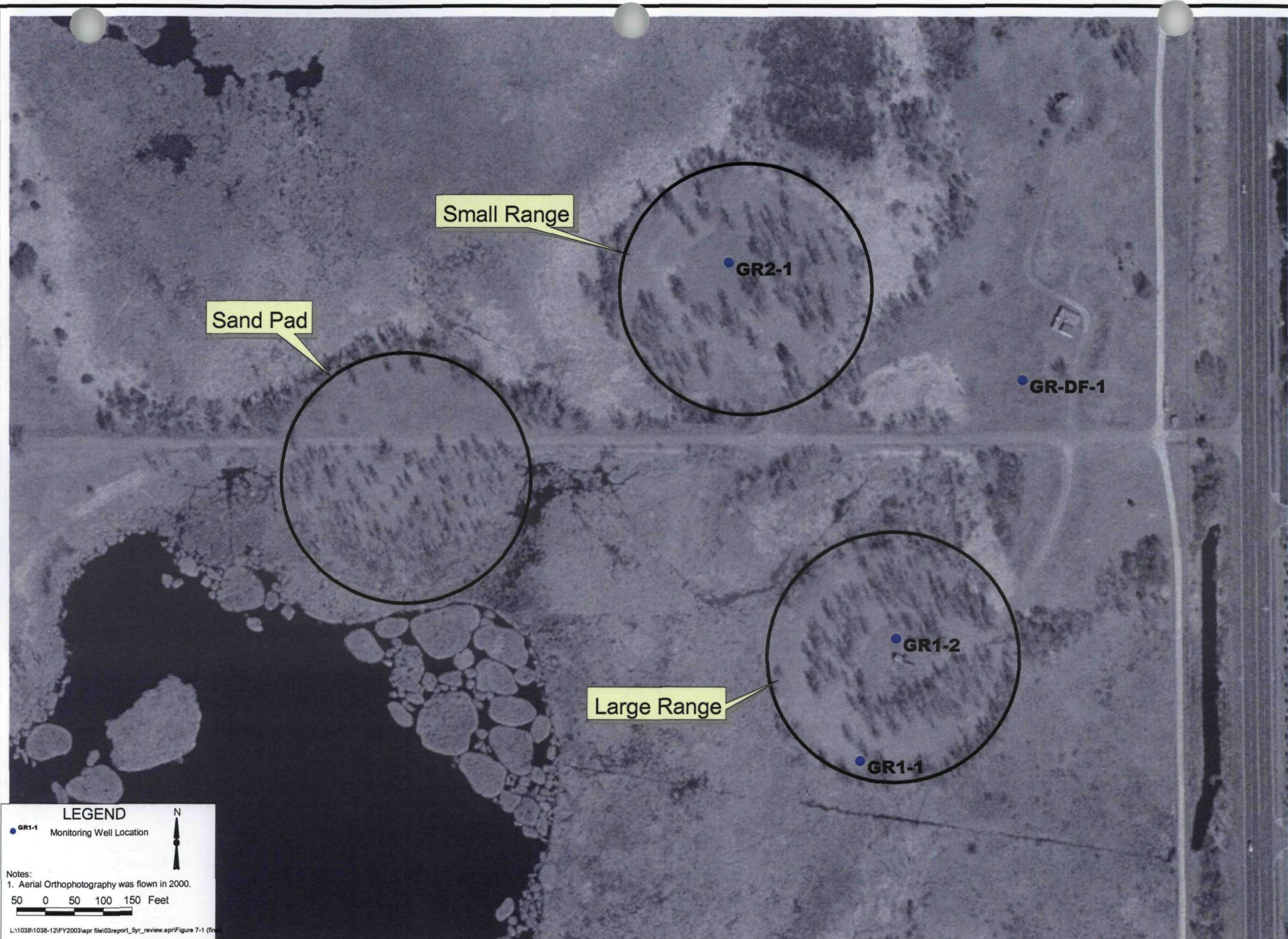
**FIGURE**  
**6 - 1**

SECOR PROJECT #: 003.18508.00.0282

FILENAME: SITE-13

DATE: 12/31/03





TWIN CITIES ARMY AMMUNITION PLANT

Grenade Range Monitoring Well Locations

**Wenck**  
Wenck Associates, Inc. 1800 Pioneer Creek Center  
Environmental Engineers Maple Plain, MN 55359-0429

SEPT 2004

Figure 7-1

Appendix A

Site Inspection Checklists

## **A.1 List of Attendees for Site Inspection**

FIVE-YEAR REVIEW SITE INSPECTION  
NEW BRIGHTON/ARDEN HILLS SUPERFUND SITE

Tuesday, 2 March 2004 - 8:30 a.m.

<u>Name</u>	<u>Organization</u>	<u>Telephone No.</u>
KEITH BENKER	TWISS	(651) 633-2301 x1623
MATT BOWERS	TWISS	(763) 479-4230
David Fuller	U.S. Army	(651) 633-2301 x1651
Lyle Salmela	RAB	651-636-6461
Vern Viek	RAB - P. Chair	(651) 633-9641
Jean Barouni	U.S. EPA Region 5	(312) 353-5577
Laura Pugh	TechLaw	(763) 208-2828
Beth Garmys	PCA	651/297 8376
Digmar Roman	-MPCA	651/296-7776
Janet B. Dabbs	Barr	952/832-2880
MIKE FIX	TCAAP	(651) 633-2301 x1661
Keith Maile	RAB	(651) 636-9457
Les Propper	New Brighton	(651) 638-2053
GREG KETL	BARR ENGINEERING	(952) 832-2874
Paul Estup / z	MPCA	(612) 860-9912
MARK FERREY	MPCA	651 296 7775
KRS FLUEGEL	PLANT OPERATOR	651 638-2065
Jim Burke	ATK	952/351-2871
Steve Hammond	NEH (Env. &)	651-634-5229

## **A.2    Operable Unit 1**



## Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable".)

I. SITE INFORMATION	
Site name: <i>Operable Unit 1 New Brighton/Arden Hills Superfund Site</i>	Date of inspection: <i>March 2, 2004</i>
Location and region: <i>Arden Hills, MN, Region 5</i>	USEPA ID: <i>MN 7213820908</i>
Agency, office or company leading the Five-Year Review: <i>U.S. Army</i>	Weather/temperature:
Remedy Includes: (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;"> <input type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____               </div> <div style="width: 45%;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls               </div> </div>	
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u><i>Dave Olson, City of N.B.</i></u> <u><i>Public Works Superintendent</i></u> <u><i>N/A</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">Name</div> <div style="width: 30%;">Title</div> <div style="width: 30%;">Date</div> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone      Phone no. <u><i>(651) 638-2113</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	
2. O&M staff <u><i>Kris Fluegel, City of N.B.</i></u> <u><i>Treatment Plant Operator</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">Name</div> <div style="width: 30%;">Title</div> <div style="width: 30%;">Date</div> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone      Phone no. <u><i>(651) 638-2065</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	

*Operable Unit 1*

3. Local regulatory authorities and response agencies (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency N/A

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

4. Other interviews (optional) ☐ Report attached.

*N/A*

**Operable Unit 1**

<b>III. ONSITE DOCUMENTS &amp; RECORDS VERIFIED (Check all that apply)</b>			
<b>1. O&amp;M Documents</b>			
O&M manual	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
As-built drawings	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks _____			
<b>2. Site Specific Health and Safety Plan</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
<input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>3. O&amp;M and OSHA Training Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Remarks _____			
<b>4. Permits and Service Agreements</b>			
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input checked="" type="checkbox"/> Waste disposal, POTW	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
<input type="checkbox"/> Other permits (see remarks)	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks _____			
<u>1) A MDNR permit exists for groundwater appropriation.</u>			
<u>2) A RCRA Hazardous Waste Generator permit exists for the spent granular activated carbon. Spent carbon is returned to the original, clean carbon supplier for regeneration.</u>			
_____			
<b>5. Gas Generation Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>6. Settlement Monument Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>7. Groundwater Monitoring Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Remarks <u>Groundwater monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</u>			
<b>8. Leachate Extraction Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>9. Discharge Compliance Records</b>			
<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input checked="" type="checkbox"/> Water (effluent)	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks _____			
<b>10. Daily Access/Security Logs</b>			
<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Remarks <u>Daily Access is not logged but security alarms operable.</u>			

*Operable Unit 1*

IV. O&M COSTS			
<b>1. O&amp;M Organization</b>			
<input type="checkbox"/> State in-house	<input type="checkbox"/> Contractor for State		
<input type="checkbox"/> PRP in-house	<input type="checkbox"/> Contractor for PRP		
<input type="checkbox"/> Federal Facility in-house	<input type="checkbox"/> Contractor for Federal Facility		
<input checked="" type="checkbox"/> Other <u>City of New Brighton</u>			
<b>2. O&amp;M Cost Records</b>			
<input checked="" type="checkbox"/> Readily available		<input checked="" type="checkbox"/> Up to date	
<input checked="" type="checkbox"/> Funding mechanism/agreement in place			
Original O&M cost estimate		<u>\$705,000 (OUI ROD, 1993 dollars)</u>	<input type="checkbox"/> Breakdown attached
Total annual cost by year for review period if available			
From	<u>1/1/99</u>	To	<u>12/31/99</u>
	Date		Date
			<u>\$1,081,409</u>
			Total cost
			<input checked="" type="checkbox"/> Breakdown attached
From	<u>1/1/00</u>	To	<u>12/31/00</u>
	Date		Date
			<u>\$1,932,448</u>
			Total cost
			<input checked="" type="checkbox"/> Breakdown attached
From	<u>1/1/01</u>	To	<u>12/31/01</u>
	Date		Date
			<u>\$1,631,181</u>
			Total cost
			<input checked="" type="checkbox"/> Breakdown attached
From	<u>1/1/02</u>	To	<u>12/31/02</u>
	Date		Date
			<u>\$1,616,144</u>
			Total cost
			<input checked="" type="checkbox"/> Breakdown attached
From	<u>1/1/03</u>	To	<u>12/31/03</u>
	Date		Date
			<u>\$1,642,088</u>
			Total cost
			<input checked="" type="checkbox"/> Breakdown attached
<b>3. Unanticipated or Unusually High O&amp;M Costs During Review Period</b>			
Describe costs and reasons:			
<u>O&amp;M costs are higher than the original estimate; however, carbon changes are now occurring at 6 month intervals rather than the 12 month interval in the original estimate. The original estimate is now over 10 years old, which also accounts for some of the disparity.</u>			
<u> </u>			
<u> </u>			
<u> </u>			

*Operable Unit 1*

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b>		<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Fencing</b>		
1. <b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks _____		
<b>B. Other Access Restrictions</b>		
1. <b>Signs and other security measures</b> <input type="checkbox"/> Location shown on map <input type="checkbox"/> N/A Remarks <u>When not attended, treatment building is locked and also has security alarms.</u>		
<b>C. Institutional Controls (ICs)</b>		
1. <b>Implementation and Enforcement</b>  <i>ICs: 1) Maintain the Minnesota Department of Health (MDH) Special Well Construction Area (SWCA).          2) Implement the TCAAP Alternate Water Supply and Well Abandonment Program.</i>  Site conditions imply ICs not properly implemented <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A Site conditions imply ICs not being fully enforced <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A  Type of monitoring (e.g., self-reporting, drive by) <u>Self-reporting (through the Annual Performance Report, the Army reports on the status of the MDH SWCA and the Alternate Water Supply and Well Abandonment Program)</u> Frequency <u>Annual</u> Responsible party/agency <u>Army</u> Contact <u>Mike Fix, Army</u> <u>Commander's Representative</u> <u>(651) 633-2301 x1661</u> <div style="display: flex; justify-content: space-between; margin-top: -10px;"> <span>Name</span> <span>Title</span> <span>Phone no.</span> </div>  Reporting is up-to-date <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Reports are verified by the lead agency <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A  Specific requirements in deed or decision documents have been met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Have there been violations <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A  Other problems or suggestions <input type="checkbox"/> Report attached _____		
2. <b>Adequacy</b> <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A Remarks _____		
<b>D. General</b>		
1. <b>Vandalism/trespassing</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident Remarks _____		
2. <b>Land use changes onsite</b> <input checked="" type="checkbox"/> N/A Remarks _____		
3. <b>Land use changes offsite</b> <input checked="" type="checkbox"/> N/A Remarks _____		



*Operable Unit 1*

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Roads damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads Adequate <input type="checkbox"/> N/A Remarks _____			
<b>B. Other Site Conditions</b>			
Remarks <u>None</u>			
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks _____			
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1. <b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
2. <b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			

**Operable Unit 1**

<b>C. Treatment System</b>	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<b>1. Treatment Train</b> (Check components that apply)		
<input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation		
<input type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers		
<input type="checkbox"/> Filters _____ <input type="checkbox"/> Others _____		
<input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____		
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance		
<input checked="" type="checkbox"/> Sampling ports properly marked and functional		
<input checked="" type="checkbox"/> Sampling/maintenance log displayed and-up to date <i>(not displayed)</i>		
<input checked="" type="checkbox"/> Equipment properly identified		
<input checked="" type="checkbox"/> Quantity of groundwater treated annually <u>Target Volume- 1.15 Billion gallons/year</u>		
<input type="checkbox"/> Quantity of surface water treated annually <u>N/A</u>		
Remarks <u>Treatment system is referred to as the Permanent Granular Activated Carbon System or "PGAC".</u>		
<u>Sampling and maintenance information is maintained in a computer database that is accessible via the computers in the PGAC treatment system office.</u>		
<b>2. Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A		
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance		
Remarks _____		
<b>3. Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A		
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs maintenance		
Remarks _____		
<b>4. Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A		
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance		
Remarks _____		
<b>5. Treatment Building(s)</b> <input type="checkbox"/> N/A		
<input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair		
<input checked="" type="checkbox"/> Chemicals and equipment properly stored		
Remarks _____		
<b>6. Monitoring Wells</b> (pump and treatment remedy) <input checked="" type="checkbox"/> Properly secured/locked		
<input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located		
<input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A		
Remarks _____		
<b>D. Monitoring Data</b>		
<b>1. Monitoring data</b>		
<input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality		
<b>2. Monitoring data suggest</b>		
<input checked="" type="checkbox"/> Contaminant concentrations are declining		
<input checked="" type="checkbox"/> Groundwater plume is effectively contained <i>(see Section XI.A for further discussion)</i>		
<b>E. Monitored Natural Attenuation</b>		
<b>1. Monitoring Wells</b> (natural attenuation remedy) <input checked="" type="checkbox"/> N/A		
<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition		
<input type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance		
Remarks _____		

*Operable Unit 1*

<b>X. OTHER REMEDIES</b>	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. <i>(See additional remedy components below.)</i>	
<b>A. Alternative Water Supply/Well Abandonment</b>	
1. <b>Well Inventory Records</b>	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up-to-Date Remarks _____
2. <b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> Contractor for State <input type="checkbox"/> PRP in-house <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Federal Facility in-house <input checked="" type="checkbox"/> Contractor for Federal Facility <input type="checkbox"/> Other _____	
3. <b>Program Status</b> a. Number of well owners previously connected to an alternate water supply: <u>  2  </u> b. Number of well owners currently scheduled to receive alternate water supply: <u>  0  </u> c. Number of wells previously abandoned: <u>  11  </u> d. Number of wells currently scheduled to be abandoned: <u>  0  </u> e. Number of well owners yet to be contacted to be offered an alternate water supply/well abandonment: <u>  0  </u>	
4. <b>Groundwater Monitoring Network</b> a. Adequacy to detect plume size increase, if it occurred <input checked="" type="checkbox"/> Adequate <input type="checkbox"/> Not adequate Remarks _____	
<b>B. Drilling Advisory</b>	
1. <b>MDH Special Well Construction Area (SWCA)</b> a. MDH SWCA currently in place <input checked="" type="checkbox"/> yes <input type="checkbox"/> no b. MDH SWCA encompasses entire plume <input checked="" type="checkbox"/> yes <input type="checkbox"/> no  Remarks: <u><i>The MDH revised the SWCA boundary in FY 2000 to more closely match the area of concern.</i></u>	
<b>XI. OVERALL OBSERVATIONS</b>	
<b>A. Implementation of the Remedy</b>	
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <u><i>The OUI groundwater recovery system (New Brighton Municipal Wells NBM#4, NBM#14 and NBM#15, along with NBM#3, NBM#5, and NBM#6 as alternates), referred to as the New Brighton Contaminated Groundwater Recovery System (NBCGRS), is intend to provide containment of the plume in the vicinity of these three municipal wells. Adherence to target pumping rates and water quality trends support the interpretation that the extraction system is effectively containing contamination in the Prairie du Chien aquifer. The degree of containment remains under discussion between the Army, USEPA, MPCA, City of New Brighton, and the Restoration Advisory Board (see Item D below regarding the containment requirement).</i></u>	

*Operable Unit 1*

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u><i>O&amp;M procedures are adequate to ensure the short- and long-term protectiveness of the remedy. The PGAC system operation has provided reliable treatment of the water to drinking water standards.</i></u></p>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u><i>None.</i></u></p>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u><i>The containment requirement has been under discussion between the Army, USEPA, MPCA, City of New Brighton, and Restoration Advisory Board. In FY 2002, the Army prepared a technical memorandum (TWISS, December 2001) regarding the feasibility of a modification to the OUI ROD. The contemplated change would be to switch from a requirement for containment, to a requirement for demonstrating that the plume is not spreading and that aquifer restoration is occurring. The Army, USEPA, MPCA, City of New Brighton, and Restoration Advisory Board have been meeting to work out technical issues regarding monitoring wells, frequency of sampling, and how to evaluate the data. These discussions are anticipated to be completed in FY 2004, which will enable the ROD modification process to move forward.</i></u></p>

## O&M COST BREAKDOWN FOR OPERABLE UNIT 1 (NBCGRS)

	1999	2000	2001	2002	2003
<b>MATERIALS AND SUPPLIES</b>					
General Materials	\$2,474	\$16,331	\$17,003	\$12,490	\$21,517
Chemicals	\$29,149	\$28,654	\$26,763	\$31,212	\$33,435
Small Equipment	\$0	\$500	\$0	\$0	\$13,016
<b>TOTAL</b>	<b>\$31,623</b>	<b>\$45,485</b>	<b>\$43,767</b>	<b>\$43,702</b>	<b>\$67,968</b>
<b>CONTRACTUAL SERVICES</b>					
Telephone	\$6,619	\$6,869	\$6,894	\$7,301	\$6,050
Utility Charges	\$129,392	\$150,385	\$180,562	\$154,477	\$165,411
Printing/Publishing		\$2,937	\$3,993	\$0	\$0
Waste Removal	\$0	\$79	\$99	\$100	\$0
Memberships	\$0	\$0	\$0	\$0	\$0
Training	\$0	\$0	\$0	\$0	\$0
Travel	\$0	\$0	\$10	\$0	\$0
Maint. of Buildings & Grounds	\$82,558	\$538,832	\$305,859	\$90,626	\$67,783
Other Services					
Insurance	\$4,900	\$5,300	\$5,900	\$6,677	\$7,100
DNR App. Fee	\$0	\$5,867	\$5,126	\$5,804	\$6,046
MCES Ind. Chg.	\$220		\$500	\$525	\$575
SAC	\$10,450	\$0	\$0	\$0	\$43,750
Sanitary Sewer	\$11,137	\$20,513	\$28,105	\$10,270	\$24,567
RC/MPCA Fee	\$1,118	\$1,056	\$645	\$525	\$525
Chemtrek, Misc.	\$1,000	\$0	\$1,050	\$550	\$0
Miscellaneous	\$7,044	\$686	\$96	\$505	\$111
Carbon Contracts	\$151,729	\$384,236	\$277,819	\$130,166	\$418,032
City Services					
Administration	\$107,400	\$110,800	\$115,500	\$119,800	\$121,900
Operations	\$234,856	\$218,984	\$206,103	\$210,447	\$154,407
Engineering	\$291,636	\$413,556	\$313,606	\$557,333	\$376,246
Legal/Professional Services	\$4,735	\$10,398	\$120,490	\$276,786	\$180,876
Auditing Services	\$0		\$1,950	\$550	\$739
Capital Outlay	\$4,992	\$16,466	\$13,108	\$0	\$0
Corrections					
<b>TOTAL</b>	<b>\$1,049,786</b>	<b>\$1,886,963</b>	<b>\$1,587,415</b>	<b>\$1,572,442</b>	<b>\$1,574,120</b>
<b>TOTAL</b>	<b>\$1,081,409</b>	<b>\$1,932,448</b>	<b>\$1,631,181</b>	<b>\$1,616,144</b>	<b>\$1,642,088</b>
<b>Projects:</b>					
Construction	\$0	\$0	\$0	\$0	\$0
Engineering	\$0	\$0	\$0	\$0	\$0
<b>TOTAL</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>GRAND TOTAL</b>	<b>\$1,081,409</b>	<b>\$1,932,448</b>	<b>\$1,631,181</b>	<b>\$1,616,144</b>	<b>\$1,642,088</b>



### **A.3    Operable Unit 2, Shallow Soil Sites**

## Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable".)

I. SITE INFORMATION			
Site name: <i>Operable Unit 2, Shallow Soil Sites (Sites A, C, E, H, 129-3, 129-5 and Dump Site 129-15) New Brighton/Arden Hills Superfund Site</i>		Date of inspection: <i>March 2, 2004</i>	
Location and region: <i>Arden Hills, MN, Region 5</i>		USEPA ID: <i>MN 7213820908</i>	
Agency, office or company leading the Five-Year Review: <i>U.S. Army</i>		Weather/temperature:	
Remedy Includes: (Check all that apply) <i>(The items checked below apply to all sites, except as noted)</i> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <input checked="" type="checkbox"/> Landfill cover/containment <i>(Sites E, H, and 129-15 only)</i>  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input checked="" type="checkbox"/> Other <u><i>Soil excavation, on-site treatment, and off-site disposal (all sites except Dump Site 129-15).</i></u> </div> <div style="width: 48%;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls               </div> </div>			
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			
II. INTERVIEWS (Check all that apply)			
1. Site Managers			
<b><i>Protective Soil Cover O&amp;M:</i></b> a. O&M site manager <u><i>Dave Hamernick, Nat'l Guard</i></u> <u><i>AHATS Coordinator</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;">             Name              Interviewed    <input checked="" type="checkbox"/> at site      <input type="checkbox"/> at office      <input type="checkbox"/> by phone              Problems, suggestions;    <input type="checkbox"/> Report attached           </div> <div style="width: 50%;">             Title              Phone no.    <u><i>(651) 775-5017</i></u> </div> </div>			
<b><i>Soil Remediation and Protective Soil Cover Construction:</i></b> b. Site manager <u><i>Kathleen Romalia, Shaw Group</i></u> <u><i>Project Manager</i></u> <u><i>N/A</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;">             Name              Interviewed    <input type="checkbox"/> at site      <input type="checkbox"/> at office      <input type="checkbox"/> by phone              Problems, suggestions;    <input type="checkbox"/> Report attached           </div> <div style="width: 50%;">             Title              Phone no.    <u><i>(303) 741-7131</i></u> </div> </div>			
2. O&M staff <u><i>N/A</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;">             Name              Interviewed    <input type="checkbox"/> at site      <input type="checkbox"/> at office      <input type="checkbox"/> by phone              Problems, suggestions;    <input type="checkbox"/> Report attached           </div> <div style="width: 50%;">             Title              Phone no.           </div> </div>			

**Operable Unit 2, Shallow Soil Sites**

3. Local regulatory authorities and response agencies (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency N/A

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
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Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

4. Other interviews (optional) ☐ Report attached.

N/A

*Operable Unit 2, Shallow Soil Sites*

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
<b>1. O&amp;M Documents</b> O&M manual ( <i>Note 1</i> ) <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A As-built drawings <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Maintenance logs <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks <u><i>1) The Land Use Control Implementation Plan (LUCIP) contains O&amp;M procedures for protective soil covers. An update of the LUCIP was in progress at the end of FY 2003.</i></u>			
<b>2. Site Specific Health and Safety Plan</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____			
<b>3. O&amp;M and OSHA Training Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks _____			
<b>4. Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> Other permits ( <i>Note 1</i> ) _____ <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks _____ <u><i>1) Excavated soils that have been treated (stabilized) have been sent to permitted landfills for disposal.</i></u> _____ _____			
<b>5. Gas Generation Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____			
<b>6. Settlement Monument Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____			
<b>7. Groundwater Monitoring Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks <u><i>Groundwater monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</i></u>			
<b>8. Leachate Extraction Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks: _____			
<b>9. Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Water (effluent) <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____			
<b>10. Daily Access/Security Logs</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks <u><i>TCAAP is a secured facility with restricted access.</i></u>			

**Operable Unit 2, Shallow Soil Sites**

IV. O&M COSTS																																											
<b>1. O&amp;M Organization</b> <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house  <input type="checkbox"/> PRP in-house  <input checked="" type="checkbox"/> Federal Facility in-house  <input type="checkbox"/> Other _____ </div> <div> <input type="checkbox"/> Contractor for State  <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Contractor for Federal Facility </div> </div>																																											
<b>2. O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <i>(Review of costs for cover O&amp;M was not deemed necessary)</i> <input checked="" type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate _____ <input type="checkbox"/> Breakdown attached  <div style="text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">From _____</td> <td style="width: 15%;">To _____</td> <td style="width: 30%;">_____</td> <td style="width: 40%;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> </table>				From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost	
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<b>3. Unanticipated or Unusually High O&amp;M Costs During Review Period</b> Describe costs and reasons: <u>N/A</u> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>																																											



*Operable Unit 2, Shallow Soil Sites*

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A												
<b>A. Fencing</b>															
1. <b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>TCAAP is a secured facility with restricted access. Fences and locked gates are in good condition.</u>															
<b>B. Other Access Restrictions</b>															
1. <b>Signs and other security measures</b> <input type="checkbox"/> Location shown on map <input type="checkbox"/> N/A Remarks <u>(see above comments on fencing) Also, protective soil covers have been constructed at Sites E, H, and 129-15 to restrict access to contaminants. In early FY 2004, the Army anticipates installing signs around the perimeter of each soil cover cautioning against disturbance of the cover areas.</u>															
<b>C. Institutional Controls (ICs)</b>															
1. <b>Implementation and Enforcement</b>  <i>ICs: 1) Prohibit activities that would exceed the exposure scenario under which the site was cleaned up (an "industrial use scenario" was utilized). For Site C only, since soil remediation is not yet complete, prohibit activities other than those required for ongoing remedial actions.</i> <i>2) Prohibit activities that would disturb protective soil covers at Sites E, H, and 129-15.</i>  <div style="display: flex; justify-content: space-between;"> <div>Site conditions imply ICs not properly implemented</div> <div> <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No    <input type="checkbox"/> N/A             </div> </div> <div style="display: flex; justify-content: space-between;"> <div>Site conditions imply ICs not being fully enforced</div> <div> <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No    <input type="checkbox"/> N/A             </div> </div> <div>             Type of monitoring (e.g., self-reporting, drive by) <u>Inspection</u>              Frequency <u>Annual</u>              Responsible party/agency <u>Army and National Guard</u>  <table style="width:100%; border: none;"> <tr> <td style="width:33%;">Contact <u>Mike Fix, Army</u></td> <td style="width:33%;"><u>Commander's Representative</u></td> <td style="width:33%;"><u>(651) 633-2301 x1661</u></td> </tr> <tr> <td align="center">Name</td> <td align="center">Title</td> <td align="center">Phone no.</td> </tr> </table> <table style="width:100%; border: none;"> <tr> <td style="width:33%;">Contact <u>Dave Hamernick, Nat'l Guard</u></td> <td style="width:33%;"><u>AHATS Coordinator</u></td> <td style="width:33%;"><u>(651) 775-5017</u></td> </tr> <tr> <td align="center">Name</td> <td align="center">Title</td> <td align="center">Phone no.</td> </tr> </table> </div> <div style="display: flex; justify-content: space-between;"> <div>Reporting is up-to-date</div> <div> <input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> N/A             </div> </div> <div style="display: flex; justify-content: space-between;"> <div>Reports are verified by the lead agency</div> <div> <input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> N/A             </div> </div> <div style="display: flex; justify-content: space-between;"> <div>Specific requirements in deed or decision documents have been met</div> <div> <input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> N/A             </div> </div> <div style="display: flex; justify-content: space-between;"> <div>Have there been violations</div> <div> <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No    <input type="checkbox"/> N/A             </div> </div> <div>             Other problems or suggestions      <input type="checkbox"/> Report attached         </div>				Contact <u>Mike Fix, Army</u>	<u>Commander's Representative</u>	<u>(651) 633-2301 x1661</u>	Name	Title	Phone no.	Contact <u>Dave Hamernick, Nat'l Guard</u>	<u>AHATS Coordinator</u>	<u>(651) 775-5017</u>	Name	Title	Phone no.
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Contact <u>Dave Hamernick, Nat'l Guard</u>	<u>AHATS Coordinator</u>	<u>(651) 775-5017</u>													
Name	Title	Phone no.													
2. <b>Adequacy</b> <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A Remarks _____															
<b>D. General</b>															
1. <b>Vandalism/trespassing</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident Remarks _____															
2. <b>Land use changes onsite</b> <input type="checkbox"/> N/A Remarks <u>In 2001, approximately 1541 acres of TCAAP were reassigned to the National Guard Bureau, which utilizes this property for military training purposes (the property is still under federal control).</u>															
3. <b>Land use changes offsite</b> <input checked="" type="checkbox"/> N/A Remarks _____															

*Operable Unit 2, Shallow Soil Sites*

VI. GENERAL SITE CONDITIONS			
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Roads damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads Adequate <input type="checkbox"/> N/A Remarks _____			
<b>B. Other Site Conditions</b>			
Remarks <u>None</u>			
VII. LANDFILL COVERS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>A. Landfill Surface</b>			
1. <b>Settlement</b> (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____			
2. <b>Cracks</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____			
3. <b>Erosion</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____			
4. <b>Holes</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____			
5. <b>Vegetative Cover</b> <input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____			
6. <b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks <u>The rip rap at Sites H and 129-15 is in good condition.</u>			
7. <b>Bulges</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident Areal extent _____ Height _____ Remarks _____			
8. <b>Wet Areas/Water Damage</b> <input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Wet areas <input type="checkbox"/> Location shown on site map                    Areal extent _____ <input type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map                    Areal extent _____ <input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map                    Areal extent _____ <input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map                    Areal extent _____ Remarks _____			
9. <b>Slope Instability</b> <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks _____			

*Operable Unit 2, Shallow Soil Sites*

<b>B. Benches</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descends down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)
<b>D. Cover Penetrations</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Gas Vents</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Evidence of leakage at penetration Remarks _____
2. <b>Gas Monitoring Probes</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Evidence of leakage at penetration Remarks _____
3. <b>Monitoring Wells</b> (within surface area of landfill) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Evidence of leakage at penetration Remarks _____
4. <b>Leachate Extraction Wells</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Evidence of leakage at penetration Remarks _____
5. <b>Settlement Monuments</b> <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input checked="" type="checkbox"/> N/A Remarks _____
<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
<b>G. Detention/Sedimentation Ponds</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
<b>H. Retaining Walls</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
<b>I. Perimeter Ditches/Off-Site Discharge</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A

*Operable Unit 2, Shallow Soil Sites*

**X. OTHER REMEDIES**

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. *(See additional remedy components below.)*

**A. Soil Remediation**

What is the current status of soil remediation:

Site A Remediation is complete. 16,226 cubic yards of metals-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility (refer to the OU2, Site A Shallow Groundwater Site Inspection for information on VOC-contaminated soil). The Closeout Report for Site A (metals-contaminated soils) has been approved, but final consistency has not yet been provided.

Site C Remediation has not been completed. 18,918 cubic yards of metals- and VOC-contaminated soil have been excavated, treated (stabilized), and transported to a permitted off-site disposal facility. Options for completing soil remediation at this site were under discussion at the end of FY 2003 (see comment below).

Site E Remediation is complete. 21,097 cubic yards of metals-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. Also, a protective soil cover was constructed over 1.6 acres of Site E (Area E1-2 west dump) where debris with asbestos-containing material (ACM) remains in-place. Testing did not show any metals-contaminated soil in the area under this cover. The Closeout Report for Site E has been approved, but final consistency has not yet been provided.

Site H Remediation is complete. 8,615 cubic yards of metals-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. Also, a protective soil cover was constructed over a portion of Site H (Area H1-3 dump) where debris with ACM remains in-place. Testing did not show any metals-contaminated soil in the area under this cover. The Closeout Report for Site H has been approved, but final consistency has not yet been provided.

Site 129-3 Remediation is complete. 3,460 tons of metals-, nitroglycerine-, and VOC-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. The Closeout Report for Site 129-3 has been approved, but final consistency has not yet been provided.

Site 129-5 Remediation is complete. 100 cubic yards of metals-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. The Closeout Report for Site 129-5 has been approved, but final consistency has not yet been provided.

What is the status of the TCAAP Corrective Action Management Unit (CAMU):

The discovery of asbestos at shallow soil sites in FY 1999 rendered further use of the CAMU impractical. The CAMU was removed in FY 2002/2003. A CAMU Closeout Report was under regulatory review at the end of FY 2003.

Describe any significant problems that have occurred during remediation activities, and whether they will require changes to the remedial design.

High groundwater elevations that are present at Site C prompted an evaluation of options for completing soil remediation at this site (under discussion at the end of FY 2003).

**B. Groundwater Monitoring (5-Year Groundwater Monitoring at Shallow Soil Sites)**

Data are routinely submitted on time	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Data are of acceptable quality	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Data suggest that no impacts to groundwater have occurred	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Remarks <u>Monitoring was initiated in FY 2003, and will tentatively end in FY 2007.</u>			

*Operable Unit 2, Shallow Soil Sites*

<b>C. Characterization of Dump Site 129-15</b>
<p>Describe the status of dump characterization: <u>Characterization work was completed in FY 1999.</u></p> <hr/> <p>If characterization is complete, describe the remedy that will be implemented and its status:</p> <p><input type="checkbox"/> No further action</p> <p><input checked="" type="checkbox"/> Other <u>Characterization revealed that a protective soil cover was required due to lead and polynuclear aromatic hydrocarbon (PAH) contamination. The cover was constructed in FY 2002. The Closeout Report for Site 129-15 has been approved, but final consistency has not yet been provided. A modification to the OU2 ROD that will document remedy selection for Site 129-15 was being prepared at the end of FY 2003.</u></p>
<p align="center"><b>XI. OVERALL OBSERVATIONS</b></p>
<p><b>A. Implementation of the Remedy</b></p> <p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p><u>For the shallow soil sites (exclusive of Dump Site 129-15), the remedy that has been selected is intended to remove soils that are contaminated above the cleanup goals specified in the OU2 ROD, restoring the site's availability for industrial use. The soil excavation, treatment, and off-site disposal remedy has effectively accomplished this objective. Remediation has been completed at Sites A, E, H, 129-3, 129-5. Due to the discovery of debris with ACM, construction of protective soil covers was necessary over portions of the dumps at Sites E and H as a means of preventing access to the ACM. The protective soil covers, in conjunction with land use controls, effectively accomplish this added objective. Site A also contained VOC-contamination (source area soils), which are discussed in the OU2, Site A Shallow Groundwater Site Inspection. Remediation at Site C has been partially completed; however, options for completing soil remediation at this site were under discussion at the end of FY 2003.</u></p> <hr/> <p><u>For Dump Site 129-15, the selected remedy was to first characterize the dump, determine if any further remedial actions were required, and then implement them. Based on the characterization work, further action was required, and the selected remedy was to construct a protective soil cover over the site as a means of preventing access to the contaminants. The protective soil cover, in conjunction with land use controls, effectively accomplishes this objective.</u></p>
<p><b>B. Adequacy of O&amp;M</b></p> <p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u>O&amp;M procedures are limited to maintaining the cautionary signs around the perimeter of each protective soil cover (the signs are anticipated to be installed in early FY 2004). These signs will help ensure the short- and long-term protectiveness of the remedy by helping to prevent prohibited activities from occurring and helping to prevent disturbance of protective soil covers. O&amp;M would also include repair of any damage to a protective soil cover; however, no such damage occurred during the period of this Five-Year Review.</u></p>
<p><b>C. Early Indicators of Potential Remedy Problems</b></p> <p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u>None.</u></p>
<p><b>D. Opportunities for Optimization</b></p> <p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u>None.</u></p>



#### **A.4    Operable Unit 2, Deep Soil Sites (D and G)**

## Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable".)

I. SITE INFORMATION	
Site name: <i>Operable Unit 2, Deep Soil Sites (D and G) New Brighton/Arden Hills Superfund Site</i>	Date of inspection: <i>March 2, 2004</i>
Location and region: <i>Arden Hills, MN, Region 5</i>	USEPA ID: <i>MN 7213820908</i>
Agency, office or company leading the Five-Year Review: <i>U.S. Army</i>	Weather/temperature:
Remedy Includes (Check all that apply) <i>(The items checked below apply to both sites, except as noted)</i> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input checked="" type="checkbox"/> Other <i>Soil vapor extraction (systems have been removed).</i>  <input checked="" type="checkbox"/> Other <i>Soil excavation, on-site treatment, and off-site disposal (remediation has been completed). (Applies to Site D only)</i> </div> <div style="width: 50%;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls           </div> </div>	
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
1. Site Managers	
<b><i>Protective Soil Cover O&amp;M:</i></b> a. O&M site manager <u><i>Dave Hamernick, Nat'l Guard</i></u> <u><i>AHATS Coordinator</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. <u><i>(651) 775-5017</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	
<b><i>Site D Shallow Soil Remediation and Site G Cover Improvement:</i></b> b. Site manager <u><i>Kathleen Romalia, Shaw Group</i></u> <u><i>Project Manager</i></u> <u><i>N/A</i></u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. <u><i>(303) 741-7131</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	
2. O&M staff <u><i>N/A</i></u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no.    _____ Problems, suggestions; <input type="checkbox"/> Report attached _____	

**Operable Unit 2, Deep Soil Sites (D and G)**

3. Local regulatory authorities and response agencies (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency N/A  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

4. Other interviews (optional) ☐ Report attached.

N/A

**Operable Unit 2, Deep Soil Sites (D and G)**

<b>III. ONSITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)			
<b>1. O&amp;M Documents</b>			
O&M manual ( <i>Note 1</i> )	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
As-built drawings	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Maintenance logs	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks <u><i>1) The Land Use Control Implementation Plan (LUCIP) contains O&amp;M procedures for protective soil covers. An update of the LUCIP was in progress at the end of FY 2003.</i></u>			
<b>2. Site Specific Health and Safety Plan</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
<input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>3. O&amp;M and OSHA Training Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Remarks _____			
<b>4. Permits and Service Agreements</b>			
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input checked="" type="checkbox"/> Other permits ( <i>Note 1</i> ) _____	<input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks _____			
<u><i>1) Excavated soils that have been treated (stabilized) have been sent to permitted landfills for disposal.</i></u>			
_____			
_____			
<b>5. Gas Generation Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>6. Settlement Monument Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>7. Groundwater Monitoring Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Remarks <u><i>Groundwater monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</i></u>			
<b>8. Leachate Extraction Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>9. Discharge Compliance Records</b>			
<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Water (effluent)	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks _____			
<b>10. Daily Access/Security Logs</b>			
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks <u><i>TCAAP is a secured facility with restricted access</i></u>			

*Operable Unit 2, Deep Soil Sites (D and G)*

IV. O&M COSTS																																																																																							
<b>1. O&amp;M Organization</b> <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house  <input type="checkbox"/> PRP in-house  <input checked="" type="checkbox"/> Federal Facility in-house  <input type="checkbox"/> Other _____ </div> <div> <input type="checkbox"/> Contractor for State  <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Contractor for Federal Facility </div> </div>																																																																																							
<b>2. O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A ( <i>Review of costs for cover O&amp;M was not deemed necessary</i> ) <input checked="" type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate _____ <input type="checkbox"/> Breakdown attached  <div style="text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From _____</td> <td style="width: 20%;">To _____</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr><td colspan="6"> </td></tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr><td colspan="6"> </td></tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr><td colspan="6"> </td></tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr><td colspan="6"> </td></tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> </table>				From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached							From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached							From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached							From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached							From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached
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Date	Date	Total cost			<input type="checkbox"/> Breakdown attached																																																																																		
<b>3. Unanticipated or Unusually High O&amp;M Costs During Review Period</b> Describe costs and reasons: <u>N/A</u> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>																																																																																							



*Operable Unit 2, Deep Soil Sites (D and G)*

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b>		<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Fencing</b>		
1. <b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>TCAAP is a secured facility with restricted access. Fences and locked gates are in good condition.</u>		
<b>B. Other Access Restrictions</b>		
1. <b>Signs and other security measures</b> <input type="checkbox"/> Location shown on map <input type="checkbox"/> N/A Remarks <u>(see above comments on fencing) Also, protective soil covers are present which restrict access to contaminants. In early FY 2004, the Army anticipates installing signs around the perimeter of each soil cover cautioning against disturbance of the cover areas.</u>		
<b>C. Institutional Controls (ICs)</b>		
1. <b>Implementation and Enforcement</b>  <i>ICs: 1) Prohibit activities that would exceed the exposure scenario under which the site was cleaned up (an "industrial use scenario" was utilized).          2) Prohibit activities that would disturb protective soil covers.</i>  <div style="display: flex; justify-content: space-between;"> <div>           Site conditions imply ICs not properly implemented            Site conditions imply ICs not being fully enforced         </div> <div> <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No    <input type="checkbox"/> N/A  <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No    <input type="checkbox"/> N/A         </div> </div> Type of monitoring (e.g., self-reporting, drive by) <u>Inspection</u> Frequency <u>Annual</u> Responsible party/agency <u>National Guard</u> <div style="display: flex; justify-content: space-between;"> <div>Contact <u>Dave Hamernick, Nat'l Guard</u></div> <div><u>AHATS Coordinator</u></div> <div><u>(651) 775-5017</u></div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div>Name</div> <div>Title</div> <div>Phone no.</div> </div> <div style="display: flex; justify-content: space-between;"> <div>           Reporting is up-to-date            Reports are verified by the lead agency         </div> <div> <input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> N/A  <input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> N/A         </div> </div> <div style="display: flex; justify-content: space-between;"> <div>           Specific requirements in deed or decision documents have been met            Have there been violations         </div> <div> <input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> N/A  <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No    <input type="checkbox"/> N/A         </div> </div> Other problems or suggestions <input type="checkbox"/> Report attached		
2. <b>Adequacy</b> <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A Remarks _____		
<b>D. General</b>		
1. <b>Vandalism/trespassing</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident Remarks _____		
2. <b>Land use changes onsite</b> <input type="checkbox"/> N/A Remarks <u>In 2001, approximately 1541 acres of TCAAP were reassigned to the National Guard Bureau, which utilizes this property for military training purposes (the property is still under federal control).</u>		
3. <b>Land use changes offsite</b> <input checked="" type="checkbox"/> N/A Remarks _____		

*Operable Unit 2, Deep Soil Sites (D and G)*

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Roads damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads Adequate <input type="checkbox"/> N/A Remarks _____			
<b>B. Other Site Conditions</b>			
Remarks <u>None</u>			
<b>VII. LANDFILL COVERS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Landfill Surface</b>			
1. <b>Settlement</b> (Low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____			
2. <b>Cracks</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident Lengths _____ Widths _____ Depths _____ Remarks _____			
3. <b>Erosion</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____			
4. <b>Holes</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Areal extent _____ Depth _____ Remarks _____			
5. <b>Vegetative Cover</b> <input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established <input checked="" type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and location s on a diagram) Remarks _____			
6. <b>Alternative Cover (armored rock, concrete, etc.)</b> <input checked="" type="checkbox"/> N/A Remarks _____			
7. <b>Bulges</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident Areal extent _____ Height _____ Remarks _____			
8. <b>Wet Areas/Water Damage</b> <input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Wet areas <input type="checkbox"/> Location shown on site map      Areal extent _____ <input type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map      Areal extent _____ <input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map      Areal extent _____ <input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map      Areal extent _____ Remarks _____			
9. <b>Slope Instability</b> <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks _____			

**Operable Unit 2, Deep Soil Sites (D and G)**

<b>B. Benches</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
<b>C. Letdown Channels</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descends down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
<b>D. Cover Penetrations</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>E. Gas Collection and Treatment</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>F. Cover Drainage Layer</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>G. Detention/Sedimentation Ponds</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>H. Retaining Walls</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>I. Perimeter Ditches/Off-Site Discharge</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>VIII. VERTICAL BARRIER WALLS</b>		
	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b>		
	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. <i>(See additional remedy components below.)</i>		
<b>A. SVE System</b>		
<p>What is the current status of the SVE systems:</p> <p><u>Site D and G SVE systems were shut down on July 24, 1998, and August 6, 1998, respectively. Site investigations conducted in FY 2000 showed that all Site D soils (shallow and deep) were below the Site D VOC cleanup levels, and that all Site G soils (shallow and deep) were below the subsequently developed, higher Site G VOC cleanup levels. Therefore, neither deep SVE systems nor enhancements to the shallow SVE systems were required at either site. The Site D and Site G SVE systems were dismantled in FY 2001 and FY 2003, respectively. The Site D Closeout Report (VOC-contaminated soils) has been approved, but final consistency has not yet been provided. The Site G Closeout Report was being prepared at the end of FY 2003.</u></p>		

*Operable Unit 2, Deep Soil Sites (D and G)*

**B. Characterize Site D Shallow Soils and Site G Dump**

**Describe the status of characterization:**

Site D: Characterization of shallow soils was completed in FY 2002.

Site G: A technical memorandum which concluded that no further characterization of the dump was needed received regulatory approval in FY 2003.

**If characterization is complete, describe the remedy that will be implemented and its status:**

**Site D:**

☐ No further action

☒ Other Characterization revealed that soil remediation was required due to metals and nitroglycerine contamination. Remediation is complete. 1,381 cubic yards of metals- and nitroglycerine-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. The Closeout Report for Site D shallow soils was under regulatory review at the end of FY 2003. A modification to the OU2 ROD that will document remedy selection for Site D shallow soils was being prepared at the end of FY 2003.

The Site D closeout report recommended that Site D be added to the list of shallow soil sites where 5-year groundwater monitoring is performed, to evaluate whether soil remediation work caused any impacts to groundwater (see Item C below).

**Site G:**

☐ No further action

☒ Other The technical memorandum regarding characterization (mentioned above) also recommended improvements to the Site G cover (which received regulatory approval in FY 2003). Cover construction was started in late FY 2003, and is anticipated to be completed in early FY 2004.

**C. Groundwater Monitoring (5-Year Groundwater Monitoring at Shallow Soil Sites)**

Data are routinely submitted on time	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Data are of acceptable quality	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Data suggest that no impacts to groundwater have occurred	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Remarks <u>Monitoring will be initiated in FY 2004.</u>			

Operable Unit 2, Deep Soil Sites (D and G)

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The SVE systems at Sites D & G were installed to remove VOCs from soil in the unsaturated zone. The systems were very effective, removing over 220,000 pounds of VOCs from startup in 1986 through shutdown in FY 1998. The SVE systems reduced the VOC concentrations in both shallow and deep soils at both sites to below cleanup levels. Having completed their objective, the SVE systems have been dismantled.

For the Site D shallow soils, the remedy that has been selected is intended to remove soils that are contaminated above the cleanup goals, restoring the site's availability for industrial use. The soil excavation, treatment, and off-site disposal remedy has effectively accomplished this objective, with remediation now complete at Site D.

The protective soil cover at Site D is intended to prevent access to PCBs that were left in-place. The protective soil cover, in conjunction with land use controls, effectively accomplishes this objective. The protective soil cover at Site G is intended to prevent access to dump materials and also reduces infiltration of precipitation, minimizing leaching of any remaining VOCs. The protective soil cover, in conjunction with land use controls, effectively accomplishes this objective.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M procedures are limited to two items. The first is maintaining the cautionary signs around the perimeter of each protective soil cover (the signs are anticipated to be installed in early FY 2004). These signs will help ensure the short- and long-term protectiveness of the remedy by helping to prevent prohibited activities from occurring and helping to prevent disturbance of protective soil covers. The second item is to annually remove any woody vegetation (greater than 2-inch diameter) to prevent deep rooting into the cover. This O&M procedure helps maintain the integrity of the cover, thereby minimizing infiltration of precipitation and helping to ensure the short- and long-term protectiveness of the remedy. O&M would also include repair of any damage to a protective soil cover; however, no such damage occurred during the period of this Five-Year Review.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None.

## **A.5    Operable Unit 2, Site A Shallow Groundwater**



## Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable".)

I. SITE INFORMATION	
Site name: <i>OU2, Site A Shallow Groundwater New Brighton/Arden Hills Superfund Site</i>	Date of inspection: <i>March 2, 2004</i>
Location and region: <i>Arden Hills, MN, Region 5</i>	USEPA ID: <i>MN 7213820908</i>
Agency, office or company leading the Five-Year Review: <i>U.S. Army</i>	Weather/temperature:
Remedy Includes: (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 48%;"> <input type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input checked="" type="checkbox"/> Other <i>Soil excavation, on-site treatment, and off-site disposal</i> </div> <div style="width: 48%;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls               </div> </div>	
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
I. Site Managers	
<b>Groundwater Extraction System O&amp;M:</b> a. O&M site manager <u><i>Keith Benker, TWISS</i></u> <u><i>Project Manager</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">Name</div> <div style="width: 30%;">Title</div> <div style="width: 30%;">Date</div> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. <u><i>(651) 633-2301 ext. 1623</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	
<b>Soil Remediation (Former 1945 Trench excavation):</b> b. Site manager <u><i>Kathleen Romalia, Shaw Group</i></u> <u><i>Project Manager</i></u> <u><i>N/A</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">Name</div> <div style="width: 30%;">Title</div> <div style="width: 30%;">Date</div> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. <u><i>(303) 741-7131</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	
<b>Groundwater Extraction System O&amp;M:</b> 2. O&M staff <u><i>Dave Knight, Tecumseh</i></u> <u><i>Project Engineer</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">Name</div> <div style="width: 30%;">Title</div> <div style="width: 30%;">Date</div> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone   Phone no. <u><i>(651) 633-2301 ext. 1636</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	

**OU2, Site A Shallow Groundwater**

3. Local regulatory authorities and response agencies (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency N/A

Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached \_\_\_\_\_

4. Other interviews (optional) ☐ Report attached.

N/A

*OU2, Site A Shallow Groundwater*

<b>III. ONSITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
<b>1. O&amp;M Documents</b>				
O&M manual	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
As-built drawings	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks _____				
<b>2. Site Specific Health and Safety Plan</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A				
Contingency plan/emergency response plan		<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks _____				
<b>3. O&amp;M and OSHA Training Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A				
Remarks _____				
<b>4. Permits and Service Agreements</b>				
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input checked="" type="checkbox"/> Waste disposal, POTW (Note 1)	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
<input type="checkbox"/> Other permits (Note 2)	<input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks <u>1) Recovered groundwater is pumped into the sanitary sewer and is ultimately treated at the Metropolitan Council Environmental Services (MCES) Treatment Plant located at 2400 Childs Road in Saint Paul, Minnesota. Discharge is authorized under Industrial Permit Number 2194 from the MCES.</u>				
<u>2) Excavated soils that have been treated (stabilized) have been sent to permitted landfills for disposal.</u>				
<b>5. Gas Generation Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A				
Remarks _____				
<b>6. Settlement Monument Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A				
Remarks _____				
<b>7. Groundwater Monitoring Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A				
Remarks <u>Groundwater monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</u>				
<b>8. Leachate Extraction Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A				
Remarks _____				
<b>9. Discharge Compliance Records</b>				
<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input checked="" type="checkbox"/> Water (effluent)	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks _____				
<b>10. Daily Access/Security Logs</b>				
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A		
Remarks <u>TCAAP is a secured facility with restricted access.</u>				

IV. O&M COSTS

1. O&M Organization

- ☐ State in-house                      ☐ Contractor for State  
☐ PRP in-house                        ☒ Contractor for PRP  
☐ Federal Facility in-house        ☐ Contractor for Federal Facility  
☐ Other \_\_\_\_\_

2. O&M Cost Records

- ☒ Readily available      ☒ Up to date  
☒ Funding mechanism/agreement in place  
 Original O&M cost estimate \$192,200 (OU2 ROD, 1997 dollars)      ☐ Breakdown attached

Total annual cost by year for review period if available

From	<u>10/1/98</u>	To	<u>9/30/99</u>	<u>Unavailable</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	
From	<u>10/1/99</u>	To	<u>9/30/00</u>	<u>Unavailable</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	
From	<u>10/1/00</u>	To	<u>9/30/01</u>	<u>\$48,000</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	
From	<u>10/1/01</u>	To	<u>9/30/02</u>	<u>\$50,000</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	
From	<u>10/1/02</u>	To	<u>9/30/03</u>	<u>\$52,000</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	

3. Unanticipated or Unusually High O&M Costs During Review Period

Describe costs and reasons: None.

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**OU2, Site A Shallow Groundwater**

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<b>A. Fencing</b>			
1. <b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>TCAAP is a secured facility with restricted access. Fences and locked gates are in good condition.</u>			
<b>B. Other Access Restrictions</b>			
1. <b>Signs and other security measures</b> <input type="checkbox"/> Location shown on map <input type="checkbox"/> N/A Remarks <u>(see above comments on fencing)</u>			
<b>C. Institutional Controls (ICs)</b>			
<b>1. Implementation and Enforcement</b>			
<i>ICs: 1) Prohibit unauthorized well construction and/or extraction of contaminated groundwater.            2) Prohibit activities that would disturb operation of the groundwater extraction/treatment system.            3) Implement the TCAAP Alternate Water Supply and Well Abandonment Program.            4) Maintain the Minnesota Department of Health (MDH) Special Well Construction Area (SWCA).</i>			
Site conditions imply ICs not properly implemented		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Site conditions imply ICs not being fully enforced		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Type of monitoring (e.g., self-reporting, drive by) <u>ICs 1&amp;2: Inspection</u>			
<u>ICs 3&amp;4: Self-reporting (through the Annual Performance Report, the Army reports on the status of the MDH SWCA and the Alternate Water Supply and Well Abandonment Program)</u>			
Frequency <u>Annual</u>			
Responsible party/agency <u>ICs 1&amp;2: National Guard</u> <u>ICs 3&amp;4: Army</u>			
Contact <u>Mike Fix, Army</u>	<u>Commander's Representative</u>	<u>(651) 633-2301 x1661</u>	
Name	Title	Phone no.	
Contact <u>Dave Hamernick, Nat'l Guard</u>	<u>AHATS Coordinator</u>	<u>(651) 775-5017</u>	
Name	Title	Phone no.	
Reporting is up-to-date		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Reports are verified by the lead agency		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Specific requirements in deed or decision documents have been met		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Have there been violations		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Other problems or suggestions		<input type="checkbox"/> Report attached	
<hr/>			
2. <b>Adequacy</b> <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A Remarks _____			
<b>D. General</b>			
1. <b>Vandalism/trespassing</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident Remarks _____			
2. <b>Land use changes onsite</b> <input type="checkbox"/> N/A Remarks <u>In 2001, approximately 1541 acres of TCAAP were reassigned to the National Guard Bureau, which utilizes this property for military training purposes (the property is still under federal control).</u>			
3. <b>Land use changes offsite</b> <input checked="" type="checkbox"/> N/A Remarks _____			

*OU2, Site A Shallow Groundwater*

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Roads damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads Adequate <input type="checkbox"/> N/A Remarks _____			
<b>B. Other Site Conditions</b>			
Remarks <u>None</u>			
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b>			
<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required we ls properly operating <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks _____			
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>			
<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1. <b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
2. <b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			



**OU2, Site A Shallow Groundwater**

<b>C. Treatment System</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. <b>Treatment Train</b> (Check components that apply) <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Metals removal  <input type="checkbox"/> Air stripping  <input type="checkbox"/> Filters  <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____  <input checked="" type="checkbox"/> Others <u>Direct discharge to sanitary sewer.</u> _____  <input checked="" type="checkbox"/> Good condition      <input type="checkbox"/> Needs maintenance  <input checked="" type="checkbox"/> Sampling ports properly marked and functional  <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date (<i>not kept on-site</i>)  <input type="checkbox"/> Equipment properly identified  <input checked="" type="checkbox"/> Quantity of groundwater treated annually <u>Approx. 8 million gallons</u>  <input type="checkbox"/> Quantity of surface water treated annually <u>N/A</u> </div> <div> <input type="checkbox"/> Oil/water separation  <input type="checkbox"/> Carbon adsorbers  <input type="checkbox"/> Bioremediation           </div> </div> Remarks _____ _____ _____	
2. <b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____ _____	
3. <b>Tanks, Vaults, Storage Vessels</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs maintenance Remarks _____ _____	
4. <b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____ _____	
5. <b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input checked="" type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____	
6. <b>Monitoring Wells</b> (pump and treatment remedy) <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>D. Monitoring Data</b>	
1. <b>Monitoring data</b> <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality	
2. <b>Monitoring data suggest</b> <input checked="" type="checkbox"/> Groundwater plume is effectively contained <input checked="" type="checkbox"/> Contaminant concentrations are declining	
<b>E. Monitored Natural Attenuation</b>	
1. <b>Monitoring Wells</b> (natural attenuation remedy) <input checked="" type="checkbox"/> N/A <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Properly secured/locked  <input type="checkbox"/> All required wells located           </div> <div> <input type="checkbox"/> Functioning  <input type="checkbox"/> Needs maintenance           </div> <div> <input type="checkbox"/> Routinely sampled  <input type="checkbox"/> Good condition           </div> </div> Remarks _____ _____	

<b>X. OTHER REMEDIES</b>
<p>If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. <i>(See additional remedy components below.)</i></p>
<p><b>A. Alternative Water Supply/Well Abandonment</b></p>
<p><i>The OU1 Alternative Water Supply and Well Abandonment Program was expanded to cover the area affected by the OU2 Site A shallow groundwater plume. (See OU1 Site Inspection for discussion of this remedy component.)</i></p>
<p><b>B. Source Characterization</b></p>
<p>Describe the status of source characterization:  <i>The source characterization investigation report was completed in FY 1998. The source of Site A shallow groundwater VOC contamination was identified as the Former 1945 Trench.</i></p>
<p>If characterization is complete, describe the remedy that will be implemented and its status:</p> <p><input type="radio"/> No further action</p> <p><input checked="" type="checkbox"/> Other <u>Remediation of metals-contaminated soils is complete (refer to Site Inspection for OU2, Shallow Soil Sites for additional information). Remediation of VOC-contaminated soils is also complete. Soil remediation was initially attempted with an SVE system that was operated from early FY 2001 through late FY 2002. Due to testing that showed sustained, elevated VOC concentrations in soils (while SVE VOC removal rates had decreased to low levels), the Army obtained regulatory approval to remove the SVE system and to implement soil remediation through soil removal. 688 cubic yards of VOC-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. The Closeout Report for Site A Former 1945 Trench was under regulatory review at the end of FY 2003.</u></p>
<b>XI. OVERALL OBSERVATIONS</b>
<p><b>A. Implementation of the Remedy</b></p>
<p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p><u>The groundwater recovery system provides containment of the VOC plume and is restoring the aquifer to the cleanup goals established in the OU2 ROD. In FY 2000, the "second line" of extraction wells (EW-5 through 8), the wells further downgradient from the source area, were shut off because these four extraction wells were below cleanup levels and since the known area of groundwater with cleanup level exceedances was within the capture area of the "first line" of extraction wells (EW-1 through 4). EW-1 through 4 pump at a combined rate that exceeds the design flow rate of 15 gpm. VOC concentrations in the plume generally show stable or decreasing trends. Water discharged to the sanitary sewer has met the discharge requirements.</u></p> <p><u>For the VOC source area soils (Former 1945 Trench), the remedy that was implemented was intended to remove soils that were contaminated above the cleanup goals specified in the OU2 ROD, restoring the site's availability for industrial use. The soil excavation, treatment, and off-site disposal remedy has effectively accomplished this objective and, in fact, based on post-excavation verification sampling, soil remediation at the Former 1945 Trench area of Site A has restored this area's availability for unrestricted use (except for groundwater use restrictions that still apply to groundwater below this area).</u></p>

*OU2, Site A Shallow Groundwater*

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u><i>The O&amp;M procedures for the groundwater recovery system are effective for providing short- and long-term protectiveness. The procedures have resulted in system operation that is providing adequate containment of the plume and restoration of the groundwater.</i></u></p> <p>_____</p> <p>_____</p>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u><i>None</i></u></p> <p>_____</p> <p>_____</p>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u><i>None</i></u></p> <p>_____</p> <p>_____</p>

## **A.6    Operable Unit 2, Site I Shallow Groundwater**

## Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable".)

I. SITE INFORMATION	
Site name: <i>OU2, Site 1 Shallow Groundwater New Brighton/Arden Hills Superfund Site</i>	Date of inspection: <i>March 2, 2004</i>
Location and region: <i>Arden Hills, MN, Region 5</i>	USEPA ID: <i>MN 7213820908</i>
Agency, office or company leading the Five-Year Review: <i>U. S. Army</i>	Weather/temperature:
Remedy Includes (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 48%;"> <input type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input checked="" type="checkbox"/> Other <u><i>Pilot testing of a dual-phase extraction system determined that the technology was not feasible due to low permeability of the soils. An amendment to the OU2 ROD will be implemented to change the preferred remedy from groundwater pump and treat to groundwater monitoring based remedy.</i></u> </div> <div style="width: 48%;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls               </div> </div>	
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u><i>Jon Bode, Alliant Techsystem</i></u> <u><i>Project Manager</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">Name</div> <div style="width: 30%;">Title</div> <div style="width: 30%;">Date</div> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone      Phone no. <u><i>(952) 351-2871</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	
2. O&M staff <u><i>Charles Cooke, CRA</i></u> <u><i>Project Manager</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">Name</div> <div style="width: 30%;">Title</div> <div style="width: 30%;">Date</div> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone      Phone no. <u><i>(651) 653-9112</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	

[illegible]



*OU2, Site 1 Shallow Groundwater*

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
<b>1. O&amp;M Documents</b>			
O&M manual	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
As-built drawings	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Maintenance logs	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks <u>No system will be constructed.</u>			
<b>2. Site Specific Health and Safety Plan</b>			
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> Contingency plan/emergency response plan	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks <u>No system will be constructed.</u>			
<b>3. O&amp;M and OSHA Training Records</b>			
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks <u>No system will be constructed.</u>			
<b>4. Permits and Service Agreements</b>			
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Other permits _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks <u>No system will be constructed.</u>			
<b>5. Gas Generation Records</b>			
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks _____			
<b>6. Settlement Monument Records</b>			
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks _____			
<b>7. Groundwater Monitoring Records</b>			
<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks <u>Groundwater monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</u>			
<b>8. Leachate Extraction Records</b>			
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks _____			
<b>9. Discharge Compliance Records</b>			
<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Water (effluent)	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks <u>No system will be constructed.</u>			
<b>10. Daily Access/Security Logs</b>			
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks <u>TCAAP is a secured facility with restricted access.</u>			

IV. O&M COSTS																																																																									
<b>1. O&amp;M Organization</b> <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house  <input type="checkbox"/> PRP in-house  <input type="checkbox"/> Federal Facility in-house  <input type="checkbox"/> Other <u>N/A. No system will be constructed.</u> </div> <div> <input type="checkbox"/> Contractor for State  <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Contractor for Federal Facility </div> </div>																																																																									
<b>2. O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A ( <i>No system will be constructed</i> ) <input type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate _____ <input type="checkbox"/> Breakdown attached  <div style="text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From _____</td> <td style="width: 20%;">To _____</td> <td style="width: 20%;"></td> <td style="width: 40%;"></td> <td style="width: 20%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr><td colspan="5"> </td></tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr><td colspan="5"> </td></tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr><td colspan="5"> </td></tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr><td colspan="5"> </td></tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> </table>				From _____	To _____				Date	Date	Total cost		<input type="checkbox"/> Breakdown attached						From _____	To _____				Date	Date	Total cost		<input type="checkbox"/> Breakdown attached						From _____	To _____				Date	Date	Total cost		<input type="checkbox"/> Breakdown attached						From _____	To _____				Date	Date	Total cost		<input type="checkbox"/> Breakdown attached						From _____	To _____				Date	Date	Total cost		<input type="checkbox"/> Breakdown attached
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<b>3. Unanticipated or Unusually High O&amp;M Costs During Review Period</b> Describe costs and reasons: <u>N/A. No system will be constructed.</u> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>																																																																									

*OU2, Site 1 Shallow Groundwater*

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<b>A. Fencing</b>			
1. Fencing damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u><i>TCAAP is a secured facility with restricted access. Fences and locked gates are in good condition.</i></u>			
<b>B. Other Access Restrictions</b>			
1. Signs and other security measures <input type="checkbox"/> Location shown on map <input type="checkbox"/> N/A Remarks <u><i>(see above comments on fencing)</i></u>			
<b>C. Institutional Controls (ICs)</b>			
<b>1. Implementation and Enforcement</b>			
<i>ICs: 1) Prohibit activities that would disturb the Building 502 floor slab.</i> <i>2) Prohibit unauthorized well construction and/or extraction of contaminated groundwater.</i>			
Site conditions imply ICs not properly implemented		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Site conditions imply ICs not being fully enforced		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Type of monitoring (e.g., self-reporting, drive by) <u><i>Inspection</i></u>			
Frequency <u><i>Annual</i></u>			
Responsible party/agency <u><i>Army</i></u>			
Contact	<u><i>Mike Fix, Army</i></u>	<u><i>Commander's Representative</i></u>	<u><i>(651) 633-2301 x1661</i></u>
	Name	Title	Phone no.
Reporting is up-to-date		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Reports are verified by the lead agency		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Specific requirements in deed or decision documents have been met		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Have there been violations		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Other problems or suggestions		<input type="checkbox"/> Report attached	
<b>2. Adequacy</b> <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A			
Remarks _____			
<b>D. General</b>			
1. <b>Vandalism/trespassing</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident Remarks _____			
2. <b>Land use changes onsite</b> <input checked="" type="checkbox"/> N/A Remarks _____			
3. <b>Land use changes offsite</b> <input checked="" type="checkbox"/> N/A Remarks _____			

**OU2, Site 1 Shallow Groundwater**

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1. <b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads Adequate	<input type="checkbox"/> N/A
Remarks _____			
<b>B. Other Site Conditions</b>			
Remarks <u>None</u>			
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<i>(No system will be constructed)</i>			
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b>			
<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1. <b>Pumps, Wellhead Plumbing, and Electrical</b>			
<input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A			
Remarks _____			
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b>			
<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks _____			
2. <b>Spare Parts and Equipment</b>			
<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided			
Remarks _____			
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>			
<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1. <b>Collection Structures, Pumps, and Electrical</b>			
<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks _____			
2. <b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b>			
<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks _____			
3. <b>Spare Parts and Equipment</b>			
<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided			
Remarks _____			

**OU2, Site 1 Shallow Groundwater**

<b>C. Treatment System</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A <i>(No system will be constructed)</i>
<b>1. Treatment Train</b> (Check components that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div> <input type="checkbox"/> Metals removal  <input type="checkbox"/> Air stripping  <input type="checkbox"/> Filters _____  <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____  <input type="checkbox"/> Good condition  <input type="checkbox"/> Sampling ports properly marked and functional  <input type="checkbox"/> Sampling/maintenance log displayed and up to date  <input type="checkbox"/> Equipment properly identified  <input type="checkbox"/> Quantity of groundwater treated annually _____  <input type="checkbox"/> Quantity of surface water treated annually _____            Remarks _____         </div> <div> <input type="checkbox"/> Oil/water separation  <input type="checkbox"/> Carbon adsorbers  <input type="checkbox"/> Others _____  <input type="checkbox"/> Needs maintenance                  </div> <div> <input type="checkbox"/> Bioremediation                  </div> </div>		
<b>2. Electrical Enclosures and Panels</b> (properly rated and functional) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____		
<b>3. Tanks, Vaults, Storage Vessels</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs maintenance Remarks _____		
<b>4. Discharge Structure and Appurtenances</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____		
<b>5. Treatment Building(s)</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____		
<b>6. Monitoring Wells</b> (pump and treatment remedy) <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks _____		
<b>D. Monitoring Data</b>		
<b>1. Monitoring data</b> <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality		
<b>2. Monitoring data suggest</b> <input checked="" type="checkbox"/> Contaminant concentrations are declining <input type="checkbox"/> Groundwater plume is effectively contained <i>(No containment system is (or will be) constructed. The Unit 1 plume is not migrating offsite; rather, the Unit 1 contaminants leak downward into Unit 3, which is hydraulically contained by the TGRS.)</i>		
<b>E. Monitored Natural Attenuation</b>		
<b>1. Monitoring Wells</b> (natural attenuation remedy) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance Remarks _____		

**OU2, Site 1 Shallow Groundwater**

<b>X. OTHER REMEDIES</b>
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. <i>(See additional remedy component below.)</i>
<b>A. Additional Investigation</b>
Describe the status of additional investigation <u>Additional investigation work is complete. Results led to proposing a dual-phase extraction remedy (combining groundwater extraction and soil vapor extraction), as further discussed in the next section.</u> <hr/> <hr/>
<b>XI. OVERALL OBSERVATIONS</b>
<b>A. Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <u>Pilot testing of a dual-phase extraction system determined that the technology was not feasible due to low permeability of the soils. An amendment to the OU2 ROD will be implemented to change the preferred remedy from groundwater pump and treat to groundwater monitoring based remedy. The monitoring based remedy is appropriate since the Unit 1 plume is not migrating offsite; rather, the Unit 1 contaminants leak downward into Unit 3, which is hydraulically contained by the TGRS.</u> <hr/> <hr/>
<b>B. Adequacy of O&amp;M</b>
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>N/A (No system will be constructed)</u> <hr/> <hr/>
<b>C. Early Indicators of Potential Remedy Problems</b>
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. <u>N/A (No system will be constructed)</u> <hr/> <hr/>
<b>D. Opportunities for Optimization</b>
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u>None.</u> <hr/> <hr/>



## **A.7    Operable Unit 2, Site K Shallow Groundwater**

## Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable".)

I. SITE INFORMATION	
Site name: <i>OU2, Site K Shallow Groundwater New Brighton/Arden Hills Superfund Site</i>	Date of inspection: <i>March 2, 2004</i>
Location and region: <i>Arden Hills, MN, Region 5</i>	EPA ID: <i>MN 7213820908</i>
Agency, office or company leading the Five-Year Review: <i>U. S. Army</i>	Weather/temperature:
Remedy Includes: (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;"> <input type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____               </div> <div style="width: 45%;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls               </div> </div>	
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u><i>Jon Bode, Alliant Techsystems</i></u> <u><i>Project Manager</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">Name</div> <div style="width: 30%;">Title</div> <div style="width: 30%;">Date</div> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. <u><i>(952) 351-2871</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	
2. O&M staff <u><i>Charles Cooke, CRA</i></u> <u><i>Project Manager</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 30%;">Name</div> <div style="width: 30%;">Title</div> <div style="width: 30%;">Date</div> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. <u><i>(651) 653-9112</i></u> Problems, suggestions; <input type="checkbox"/> Report attached _____	

### ***OU2, Site K Shallow Groundwater***

3. Local regulatory authorities and response agencies (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency N/A

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
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Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

## Contact

Name	Title	Date	Phone no.
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Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_

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Contact

Name	Title	Date	Phone no.
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Problems; suggestions: ☐ Report attached

Agency

Contact \_\_\_\_\_

Name	Title	Date	Phone no.
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Problems; suggestions: ☐ Report attached

4. Other interviews (optional) ☐ Report attached.

N/A

*OU2, Site K Shallow Groundwater*

<b>III. ONSITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)			
<b>1. O&amp;M Documents</b> O&M manual <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A As-built Drawings <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Maintenance logs <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks <u>The current month's maintenance logs are stored onsite; older logs are stored off-site.</u>  			
<b>2. Site Specific Health and Safety Plan</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____ 			
<b>3. O&amp;M and OSHA Training Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks _____ 			
<b>4. Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A (Note 1) <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Other permits _____ <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____ <u>1) An air emissions permit is not required.</u> 			
<b>5. Gas Generation Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____ 			
<b>6. Settlement Monument Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____ 			
<b>7. Groundwater Monitoring Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks <u>Groundwater monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</u> 			
<b>8. Leachate Extraction Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____ 			
<b>9. Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> Water (effluent) <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks _____ 			
<b>10. Daily Access/Security Logs</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks <u>TCAAP is a secured facility with restricted access.</u> 			

IV. O&M COSTS																																																			
<b>1. O&amp;M Organization</b> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> State in-house  <input type="checkbox"/> PRP in-house  <input type="checkbox"/> Federal Facility in-house  <input type="checkbox"/> Other _____ </div> <div style="width: 45%;"> <input type="checkbox"/> Contractor for State  <input checked="" type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Contractor for Federal Facility </div> </div>																																																			
<b>2. O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date ( <i>Costs are proprietary.</i> ) <input checked="" type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate _____ <input type="checkbox"/> Breakdown attached  <div style="text-align: center; margin-bottom: 10px;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">From _____</td> <td style="width: 15%;">To _____</td> <td style="width: 30%;"></td> <td style="width: 15%;"></td> <td style="width: 25%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> </table>				From _____	To _____					Date	Date		Total cost		<input type="checkbox"/> Breakdown attached	From _____	To _____				<input type="checkbox"/> Breakdown attached	Date	Date		Total cost			From _____	To _____				<input type="checkbox"/> Breakdown attached	Date	Date		Total cost			From _____	To _____				<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		
From _____	To _____																																																		
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Date	Date		Total cost																																																
From _____	To _____				<input type="checkbox"/> Breakdown attached																																														
Date	Date		Total cost																																																
<b>3. Unanticipated or Unusually High O&amp;M Costs During Review Period</b> Describe costs and reasons: <u>None.</u> <hr/> <hr/> <hr/> <hr/> <hr/>																																																			

*OU2, Site K Shallow Groundwater*

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<b>A. Fencing</b>			
1. <b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>TCAAP is a secured facility with restricted access. Fences and locked gates are in good condition.</u>			
<b>B. Other Access Restrictions</b>			
1. <b>Signs and other security measures</b> <input type="checkbox"/> Location shown on map <input type="checkbox"/> N/A Remarks <u>(see above comments on fencing)</u>			
<b>C. Institutional Controls (ICs)</b>			
<b>1. Implementation and Enforcement</b>			
<i>ICs: 1) Prohibit activities that would disturb the Building 103 floor slab.            2) Prohibit unauthorized well construction and/or extraction of contaminated groundwater.            3) Prohibit activities that would disturb operation of the groundwater extraction/treatment system.</i>			
Site conditions imply ICs not properly implemented		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Site conditions imply ICs not being fully enforced		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Type of monitoring (e.g., self-reporting, drive by) <u>Inspection</u>			
Frequency <u>Annual</u>			
Responsible party/agency <u>Army</u>			
Contact <u>Mike Fix, Army</u>	<u>Commander's Representative</u>	<u>(651) 633-2301 x1661</u>	
	Name	Title	Phone no.
Reporting is up-to-date		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Reports are verified by the lead agency		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Specific requirements in deed or decision documents have been met		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Have there been violations		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Other problems or suggestions		<input type="checkbox"/> Report attached	
<b>2. Adequacy</b> <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A			
Remarks _____			
<b>D. General</b>			
1. <b>Vandalism/trespassing</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident Remarks _____			
2. <b>Land use changes onsite</b> <input checked="" type="checkbox"/> N/A Remarks _____			
3. <b>Land use changes offsite</b> <input checked="" type="checkbox"/> N/A Remarks _____			



*OU2, Site K Shallow Groundwater*

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Roads damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads Adequate <input type="checkbox"/> N/A Remarks _____			
<b>B. Other Site Conditions</b> Remarks <u>None</u>			
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks _____			
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1. <b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
2. <b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			

**OU2, Site K Shallow Groundwater**

<b>C. Treatment System</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>1. Treatment Train</b> (Check components that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div> <input type="checkbox"/> Metals removal  <input checked="" type="checkbox"/> Air stripping  <input type="checkbox"/> Filters _____  <input type="checkbox"/> Additive (e.g., chelation agent, flocculent)  <input type="checkbox"/> Good condition  <input checked="" type="checkbox"/> Sampling ports properly marked and functional  <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date <i>(not displayed on-site)</i>  <input type="checkbox"/> Equipment properly identified  <input checked="" type="checkbox"/> Quantity of groundwater treated annually <u>Approx. 4 million gallons</u>  <input type="checkbox"/> Quantity of surface water treated annually <u>N/A</u> </div> <div> <input type="checkbox"/> Oil/water separation  <input type="checkbox"/> Carbon adsorbers  <input type="checkbox"/> Others _____  <input type="checkbox"/> Needs maintenance  <input type="checkbox"/> _____  <input type="checkbox"/> _____  <input type="checkbox"/> _____                 </div> <div> <input type="checkbox"/> Bioremediation                 </div> </div> Remarks _____ _____ _____ _____	
<b>2. Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____ _____	
<b>3. Tanks, Vaults, Storage Vessels</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs maintenance Remarks _____ _____	
<b>4. Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____ _____	
<b>5. Treatment Building(s)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored <i>(N/A)</i> Remarks _____ _____	
<b>6. Monitoring Wells</b> (pump and treatment remedy) <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>D. Monitoring Data</b>	
<b>1. Monitoring data</b> <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality	
<b>2. Monitoring data suggest</b> <input checked="" type="checkbox"/> Groundwater plume is effectively contained <input checked="" type="checkbox"/> Contaminant concentrations are declining	
<b>E. Monitored Natural Attenuation</b>	
<b>1. Monitoring Wells</b> (natural attenuation remedy) <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance Remarks _____ _____	

<b>X. OTHER REMEDIES</b>	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. <i>(See additional remedy component below.)</i>	
<b>A. Additional Investigation</b>	
Describe the status of additional investigation <u>Additional investigation work is complete. The investigation defined the location of VOC-contaminated soils located beneath Building 103 and refined the location of the source area.</u>	
<b>XI. OVERALL OBSERVATIONS</b>	
<b>A. Implementation of the Remedy</b>	
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <u>The remedy is intended to provide containment of the groundwater plume and to restore the groundwater to the cleanup levels specified in the OU2 ROD. The groundwater recovery and treatment system is effective since it is containing the plume and since treated water is in compliance with the discharge requirements. The additional investigation further defined the source area. Pilot studies of two groundwater remediation technologies were conducted: Hydrogen Release Compound (HRC) and direct hydrogen injection with gas-permeable membranes. The use of HRC was not effective. The direct hydrogen injection yielded promising results but further technological advancement is required to make a full-scale operation feasible.</u>	
<b>B. Adequacy of O&amp;M</b>	
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>O&amp;M procedures are deemed adequate to ensure short- and long-term protectiveness of the remedy. Containment is being achieved and discharge requirements are consistently met.</u>	
<b>C. Early Indicators of Potential Remedy Problems</b>	
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. <u>None.</u>	
<b>D. Opportunities for Optimization</b>	
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u>None.</u>	

## **A.8    Operable Unit 2, Deep Groundwater**

## Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable".)

I. SITE INFORMATION					
Site name: <b><i>OU2 Deep Groundwater New Brighton/Arden Hills Superfund Site</i></b>		Date of inspection: <b><i>March 2, 2004</i></b>			
Location and region: <b><i>Arden Hills, MN, Region 5</i></b>		USEPA ID: <b><i>MN 7213820908</i></b>			
Agency, office or company leading the Five-Year Review: <b><i>U. S. Army</i></b>		Weather/temperature:			
Remedy Includes: (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____               </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls               </td> </tr> </table>				<input type="checkbox"/> Landfill cover/containment <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls				
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached					
II. INTERVIEWS (Check all that apply)					
1. O&M site manager <b><i>Jon Bode, Alliant Techsystems</i></b> <b><i>Project Manager</i></b> <b><i>March 2, 2004</i></b> <div style="display: flex; justify-content: space-between; font-size: small;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone      Phone no. <b><i>(952) 351-2871</i></b> Problems, suggestions; <input type="checkbox"/> Report attached _____					
2. O&M staff <b><i>Shawn Horn, CRA</i></b> <b><i>Project Manager</i></b> <b><i>March 2, 2004</i></b> <div style="display: flex; justify-content: space-between; font-size: small;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone      Phone no. <b><i>(651) 639-0913</i></b> Problems, suggestions; <input type="checkbox"/> Report attached _____					

**OU2 Deep Groundwater**

3. Local regulatory authorities and response agencies (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency N/A  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

4. Other interviews (optional) ☐ Report attached.

N/A



**OU2 Deep Groundwater**

<b>III. ONSITE DOCUMENTS &amp; RECORDS VERIFIED (Check all that apply)</b>			
<b>1. O&amp;M Documents</b>			
O&M manual	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
As-built drawings	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks _____			
<b>2. Site Specific Health and Safety Plan</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Contingency plan/emergency response plan		<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
Remarks _____			
<b>3. O&amp;M and OSHA Training Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Remarks _____			
<b>4. Permits and Service Agreements</b>			
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Other permits _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks _____			
<b>5. Gas Generation Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>6. Settlement Monument Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>7. Groundwater Monitoring Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Remarks <u>Groundwater monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</u>			
<b>8. Leachate Extraction Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>9. Discharge Compliance Records</b>			
<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input checked="" type="checkbox"/> Water (effluent)	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks <u>Discharge monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</u>			
<b>10. Daily Access/Security Logs</b>			
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks <u>TCAAP is a secured facility with restricted access.</u>			

**OU2 Deep Groundwater**

**IV. O&M COSTS**

**1. O&M Organization**

- |  |  |
|--|--|
| <input type="checkbox"/> State in-house            | <input type="checkbox"/> Contractor for State            |
| <input type="checkbox"/> PRP in-house              | <input checked="" type="checkbox"/> Contractor for PRP   |
| <input type="checkbox"/> Federal Facility in-house | <input type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other _____               |  |

**2. O&M Cost Records**

- ☒ Readily available      ☒ Up to date  
☒ Funding mechanism/agreement in place  
Original O&M cost estimate    **\$732,700 (OU2 ROD, 1997 dollars)**    ☐ Breakdown attached

Total annual cost by year for review period if available

From	<u>10/1/98</u>	To	<u>9/30/99</u>	<u>\$550,000</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	
From	<u>10/1/99</u>	To	<u>9/30/00</u>	<u>\$601,000</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	
From	<u>10/1/00</u>	To	<u>9/30/01</u>	<u>\$871,000</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	
From	<u>10/1/01</u>	To	<u>9/30/02</u>	<u>\$662,000</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	
From	<u>10/1/02</u>	To	<u>9/30/03</u>	<u>\$727,000</u>	<input type="checkbox"/> Breakdown attached
	Date		Date	Total cost	

**3. Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: None.

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*OU2 Deep Groundwater*

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A												
<b>A. Fencing</b>															
1. <b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>TCAAP is a secured facility with restricted access. Fences and locked gates are in good condition.</u>															
<b>B. Other Access Restrictions</b>															
1. <b>Signs and other security measures</b> <input type="checkbox"/> Location shown on map <input type="checkbox"/> N/A Remarks <u>(see above comments on fencing)</u>															
<b>C. Institutional Controls (ICs)</b>															
1. <b>Implementation and Enforcement</b>  <i>ICs: 1) Prohibit unauthorized well construction and/or extraction of contaminated groundwater.          2) Prohibit activities that would disturb operation of the groundwater extraction/treatment system.</i>  Site conditions imply ICs not properly implemented <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A Site conditions imply ICs not being fully enforced <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A  Type of monitoring (e.g., self-reporting, drive by) <u>Inspection</u> Frequency <u>Annual</u> Responsible party/agency <u>Army and National Guard</u> <table style="width:100%; border: none;"> <tr> <td style="width:33%;">Contact <u>Mike Fix, Army</u></td> <td style="width:33%;">Commander's Representative</td> <td style="width:33%;">(651) 633-2301 x1661</td> </tr> <tr> <td align="center">Name</td> <td align="center">Title</td> <td align="center">Phone no.</td> </tr> <tr> <td>Contact <u>Dave Hamernick, Nat'l Guard</u></td> <td>AHATS Coordinator</td> <td>(651) 775-5017</td> </tr> <tr> <td align="center">Name</td> <td align="center">Title</td> <td align="center">Phone no.</td> </tr> </table> Reporting is up-to-date <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Reports are verified by the lead agency <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A  Specific requirements in deed or decision documents have been met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Have there been violations <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A  Other problems or suggestions <input type="checkbox"/> Report attached <u> </u>				Contact <u>Mike Fix, Army</u>	Commander's Representative	(651) 633-2301 x1661	Name	Title	Phone no.	Contact <u>Dave Hamernick, Nat'l Guard</u>	AHATS Coordinator	(651) 775-5017	Name	Title	Phone no.
Contact <u>Mike Fix, Army</u>	Commander's Representative	(651) 633-2301 x1661													
Name	Title	Phone no.													
Contact <u>Dave Hamernick, Nat'l Guard</u>	AHATS Coordinator	(651) 775-5017													
Name	Title	Phone no.													
2. <b>Adequacy</b> <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A Remarks <u> </u>															
<b>D. General</b>															
1. <b>Vandalism/trespassing</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident Remarks <u> </u>															
2. <b>Land use changes onsite</b> <input type="checkbox"/> N/A Remarks <u>In 2001, approximately 1541 acres of TCAAP were reassigned to the National Guard Bureau, which utilizes this property for military training purposes (the property is still under federal control).</u>															
3. <b>Land use changes offsite</b> <input checked="" type="checkbox"/> N/A Remarks <u> </u>															

**OU2 Deep Groundwater**

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Roads damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads Adequate <input type="checkbox"/> N/A Remarks _____			
<b>B. Other Site Conditions</b>			
Remarks <u>None</u>			
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b>			
<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks _____			
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1. <b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
2. <b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			

**OU2 Deep Groundwater**

<b>C. Treatment System</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<b>1. Treatment Train</b> (Check components that apply)			
<input type="checkbox"/> Metals removal	<input type="checkbox"/> Oil/water separation	<input type="checkbox"/> Bioremediation	
<input checked="" type="checkbox"/> Air stripping	<input type="checkbox"/> Carbon adsorbers		
<input type="checkbox"/> Filters _____	<input type="checkbox"/> Others _____		
<input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____			
<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance		
<input type="checkbox"/> Sampling ports properly marked and functional			
<input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date			
<input checked="" type="checkbox"/> Equipment properly identified			
<input checked="" type="checkbox"/> Quantity of groundwater treated annually <u>Approximately one billion gallons</u>			
<input type="checkbox"/> Quantity of surface water treated annually <u>N/A</u>			
Remarks _____			
<b>2. Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A			
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks _____			
<b>3. Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A			
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs maintenance			
Remarks _____			
<b>4. Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A			
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks _____			
<b>5. Treatment Building(s)</b> <input type="checkbox"/> N/A			
<input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair			
<input checked="" type="checkbox"/> Chemicals and equipment properly stored			
Remarks _____			
<b>6. Monitoring Wells</b> (pump and treatment remedy) <input checked="" type="checkbox"/> Properly secured/locked			
<input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located			
<input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A			
Remarks _____			
<b>D. Monitoring Data</b>			
<b>1. Monitoring data</b>			
<input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality			
<b>2. Monitoring data suggest</b>			
<input checked="" type="checkbox"/> Groundwater plume is effectively contained <input checked="" type="checkbox"/> Contaminant concentrations are declining			
<b>E. Monitored Natural Attenuation</b>			
<b>1. Monitoring Wells</b> (natural attenuation remedy) <input checked="" type="checkbox"/> N/A			
<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition			
<input type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance			
Remarks _____			

**OU2 Deep Groundwater**

<b>X. OTHER REMEDIES</b>
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. <i>(See additional remedy component below.)</i>
<b>A. Review of New Technologies</b>
Are reviews conducted <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Remarks <u>Natural attenuation is being reviewed. Also, the Annual Performance Report includes review of new technologies, as applicable.</u>
<b>XI. OVERALL OBSERVATIONS</b>
<b>A. Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <u>The TCAAP Groundwater Recovery System (TGRS) provides containment of the VOC plume (to the cleanup goals) and provides contaminant removal from the highest groundwater contamination areas (source areas). The system is shrinking the size of the plume. The system has been effective at mass removal. Since system start-up in 1987, the TGRS has removed 185,977 pounds of VOCs. In FY 2003, the TGRS removed 3,041 pounds of VOCs. The annual mass removal has generally been declining since FY 1992, but continues to remove a relatively large mass of VOCs each year. The treatment component (air stripping) is effective, since discharge requirements are consistently met.</u>
<b>B. Adequacy of O&amp;M</b>
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>O&amp;M procedures are providing short- and long-term protectiveness of the remedy. The system has run without significant problems and in a manner that provides the desired containment and level of treatment prior to discharge.</u>
<b>C. Early Indicators of Potential Remedy Problems</b>
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. <u>None.</u>
<b>D. Opportunities for Optimization</b>
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u>In FY 2003, a revised TGRS operating strategy (TGRS Operating Strategy, CRA) was approved by the MPCA and USEPA and was implemented, resulting in installation of one extraction well (B13), shut down of four extraction wells (B2, B7, B10, and SC3), and adjustment of extraction well flow rates to conform to the rates specified in the Operating Strategy. Due to the less than predicted performance of well B13, additional corrective measures for the south VOC plume will be evaluated and implemented in FY 2004.</u>



## **A.9    Operable Unit 3**

## Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable".)

I. SITE INFORMATION	
Site name: <b><i>Operable Unit 3 New Brighton/Arden Hills Superfund Site</i></b>	Date of inspection: <b><i>March 2, 2004</i></b>
Location and region: <b><i>Arden Hills, MN, Region 5</i></b>	USEPA ID: <b><i>MN 7213820908</i></b>
Agency, office or company leading the Five-Year Review: <b><i>U. S. Army</i></b>	Weather/temperature:
Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment (<i>see Note 1</i>)  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____             </div> <div style="width: 50%;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment (<i>see Note 1</i>)  <input type="checkbox"/> Vertical barrier walls             </div> </div>	
<b><u>Note 1: The PGRS was shut off in FY 2001 (and remained in standby status until May 2003), since VOC concentrations in wells the vicinity of the PGRS extraction well had decreased to below the cleanup levels in the OU3 ROD. The City of New Brighton elected to operate the PGRS, on an as needed basis, between May and October 2003 solely to meet peak water supply demands (and not for the purposes of containment). In October 2003, the City of New Brighton placed the PGRS back into standby status.</u></b>	
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u><b><i>Dave Olson, City of N.B.</i></b></u> <u><b><i>Public Works Superintendent</i></b></u> <u><b><i>N/A</i></b></u> <div style="display: flex; justify-content: space-between;"> <div>               Name                Interviewed    <input type="checkbox"/> at site    <input type="checkbox"/> at office    <input type="checkbox"/> by phone                Problems, suggestions;    <input type="checkbox"/> Report attached _____             </div> <div>               Title                Phone no.    <u><b><i>(651) 638-2113</i></b></u> </div> <div>               Date  </div> </div>	
2. O&M staff <u><b><i>Kris Fluegel, City of N.B.</i></b></u> <u><b><i>Treatment Plant Operator</i></b></u> <u><b><i>N/A</i></b></u> <div style="display: flex; justify-content: space-between;"> <div>               Name                Interviewed    <input type="checkbox"/> at site    <input type="checkbox"/> at office    <input type="checkbox"/> by phone                Problems, suggestions;    <input type="checkbox"/> Report attached _____             </div> <div>               Title                Phone no.    <u><b><i>(651) 638-2065</i></b></u> </div> <div>               Date  </div> </div>	

*Operable Unit 3*

3. Local regulatory authorities and response agencies (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency N/A  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
Problems; suggestions; <input type="checkbox"/> Report attached _____			

4. Other interviews (optional) ☐ Report attached.

N/A

*Operable Unit 3*

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
<b>1. O&amp;M Documents</b> O&M manual <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A As-built drawings <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Maintenance logs <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks <u>Complete OU3 (PGRS) manuals are located at the PGAC (OU1 treatment plant).</u>			
<b>2. Site Specific Health and Safety Plan</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> Contingency plan/emergency response plan <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____			
<b>3. O&amp;M and OSHA Training Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks _____			
<b>4. Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> Waste disposal, POTW <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Other permits <u>(see remarks)</u> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks _____ <u>1) A MDNR permit exists for groundwater appropriation.</u> <u>2) A RCRA hazardous waste generator permit exists for the spent granular activated carbon. Spent carbon is returned to the original, clean carbon supplier for regeneration.</u>			
<b>5. Gas Generation Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____			
<b>6. Settlement Monument Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____			
<b>7. Groundwater Monitoring Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks <u>Groundwater monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</u>			
<b>8. Leachate Extraction Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A Remarks _____			
<b>9. Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> Water (effluent) <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks _____			
<b>10. Daily Access/Security Logs</b> <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> N/A Remarks <u>Daily access to site is not logged, but security alarms are operable.</u>			

*Operable Unit 3*

IV. O&M COSTS																																																															
<b>1. O&amp;M Organization</b> <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house  <input type="checkbox"/> PRP in-house  <input type="checkbox"/> Federal Facility in-house  <input checked="" type="checkbox"/> Other <u>City of New Brighton</u> </div> <div> <input type="checkbox"/> Contractor for State  <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Contractor for Federal Facility </div> </div>																																																															
<b>2. O&amp;M Cost Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate <u>\$276,000 (OU3 ROD, 1992 dollars)</u> <input checked="" type="checkbox"/> Breakdown attached  <div align="center">Total annual cost by year for review period if available</div> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;">From</td> <td style="width:20%;"><u>1/1/99</u></td> <td style="width:15%;">To</td> <td style="width:20%;"><u>12/31/99</u></td> <td style="width:20%;"><u>\$219,655</u></td> <td style="width:10%;"><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td></td> <td>Date</td> <td></td> <td>Date</td> <td>Total cost</td> <td></td> </tr> <tr> <td>From</td> <td><u>1/1/00</u></td> <td>To</td> <td><u>12/31/00</u></td> <td><u>\$188,466</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td></td> <td>Date</td> <td></td> <td>Date</td> <td>Total cost</td> <td></td> </tr> <tr> <td>From</td> <td><u>1/1/01</u></td> <td>To</td> <td><u>12/31/01</u></td> <td><u>\$228,678</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td></td> <td>Date</td> <td></td> <td>Date</td> <td>Total cost</td> <td></td> </tr> <tr> <td>From</td> <td><u>1/1/02</u></td> <td>To</td> <td><u>12/31/02</u></td> <td><u>\$75,411</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td></td> <td>Date</td> <td></td> <td>Date</td> <td>Total cost</td> <td></td> </tr> <tr> <td>From</td> <td><u>1/1/03</u></td> <td>To</td> <td><u>12/31/03</u></td> <td><u>\$30,720</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td></td> <td>Date</td> <td></td> <td>Date</td> <td>Total cost</td> <td></td> </tr> </table>				From	<u>1/1/99</u>	To	<u>12/31/99</u>	<u>\$219,655</u>	<input checked="" type="checkbox"/> Breakdown attached		Date		Date	Total cost		From	<u>1/1/00</u>	To	<u>12/31/00</u>	<u>\$188,466</u>	<input checked="" type="checkbox"/> Breakdown attached		Date		Date	Total cost		From	<u>1/1/01</u>	To	<u>12/31/01</u>	<u>\$228,678</u>	<input checked="" type="checkbox"/> Breakdown attached		Date		Date	Total cost		From	<u>1/1/02</u>	To	<u>12/31/02</u>	<u>\$75,411</u>	<input checked="" type="checkbox"/> Breakdown attached		Date		Date	Total cost		From	<u>1/1/03</u>	To	<u>12/31/03</u>	<u>\$30,720</u>	<input checked="" type="checkbox"/> Breakdown attached		Date		Date	Total cost	
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	Date		Date	Total cost																																																											
<b>3. Unanticipated or Unusually High O&amp;M Costs During Review Period</b> Describe costs and reasons: <u>None.</u>         																																																															

*Operable Unit 3*

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b>		<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Fencing</b>		
1. <b>Fencing damaged</b>	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A	
Remarks _____		
<b>B. Other Access Restrictions</b>		
1. <b>Signs and other security measures</b>	<input type="checkbox"/> Location shown on map <input type="checkbox"/> N/A	
Remarks <u>When not attended, treatment building is locked and also has security alarms.</u>		
<b>C. Institutional Controls (ICs)</b>		
1. <b>Implementation and Enforcement</b>		
<p><i>ICs: 1) Maintain the Minnesota Department of Health (MDH) Special Well Construction Area (SWCA).  2) Implement the TCAAP Alternate Water Supply and Well Abandonment Program.</i></p>		
Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Type of monitoring (e.g., self-reporting, drive by) <u>Self-reporting (through the Annual Performance Report, the Army reports on the status of the MDH SWCA and the Alternate Water Supply and Well Abandonment Program)</u>		
Frequency <u>Annual</u>		
Responsible party/agency <u>Army</u>		
Contact <u>Mike Fix, Army</u>	<u>Commander's Representative</u>	<u>(651) 633-2301 x1661</u>
Name	Title	Phone no.
Reporting is up-to-date	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Reports are verified by the lead agency	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Specific requirements in deed or decision documents have been met	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Have there been violations	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Other problems or suggestions <input type="checkbox"/> Report attached		
_____		
2. <b>Adequacy</b>	<input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A	
Remarks _____		
<b>D. General</b>		
1. <b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident	
Remarks _____		
2. <b>Land use changes onsite</b>	<input checked="" type="checkbox"/> N/A	
Remarks _____		
3. <b>Land use changes offsite</b>	<input checked="" type="checkbox"/> N/A	
Remarks _____		



*Operable Unit 3*

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Roads damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads Adequate <input type="checkbox"/> N/A Remarks _____			
<b>B. Other Site Conditions</b>			
Remarks <u>None</u>			
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b>			
<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks _____			
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>			
<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1. <b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
2. <b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks _____			
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____			

*Operable Unit 3*

<b>C. Treatment System</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<b>1. Treatment Train</b> (Check components that apply)			
<input type="checkbox"/> Metals removal	<input type="checkbox"/> Oil/water separation	<input type="checkbox"/> Bioremediation	
<input type="checkbox"/> Air stripping	<input checked="" type="checkbox"/> Carbon adsorbers		
<input type="checkbox"/> Filters _____	<input type="checkbox"/> Others _____		
<input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____			
<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance		
<input checked="" type="checkbox"/> Sampling ports properly marked and functional			
<input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date ( <i>not displayed</i> )			
<input checked="" type="checkbox"/> Equipment properly identified			
<input checked="" type="checkbox"/> Quantity of groundwater treated annually <u>PGRS is in standby status.</u>			
<input type="checkbox"/> Quantity of surface water treated annually <u>N/A</u>			
Remarks <u>Sampling and maintenance information is maintained in a computer database that is accessible via computers in the PGAC treatment system office.</u>			
<b>2. Electrical Enclosures and Panels</b> (properly rated and functional)		<input type="checkbox"/> N/A	
<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance		
Remarks _____			
<b>3. Tanks, Vaults, Storage Vessels</b>		<input type="checkbox"/> N/A	
<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Proper secondary containment	<input type="checkbox"/> Needs maintenance	
Remarks _____			
<b>4. Discharge Structure and Appurtenances</b>		<input type="checkbox"/> N/A	
<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance		
Remarks _____			
<b>5. Treatment Building(s)</b>		<input type="checkbox"/> N/A	
<input checked="" type="checkbox"/> Good condition (esp. roof and doorways)	<input type="checkbox"/> Needs repair		
<input checked="" type="checkbox"/> Chemicals and equipment properly stored			
Remarks _____			
<b>6. Monitoring Wells</b> (pump and treatment remedy)		<input checked="" type="checkbox"/> Properly secured/locked	
<input checked="" type="checkbox"/> Functioning	<input checked="" type="checkbox"/> Routinely sampled	<input checked="" type="checkbox"/> Good condition	<input checked="" type="checkbox"/> All required wells located
<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A		
Remarks _____			
<b>D. Monitoring Data</b>			
<b>1. Monitoring data</b>			
<input checked="" type="checkbox"/> Is routinely submitted on time		<input checked="" type="checkbox"/> Is of acceptable quality	
<b>2. Monitoring data suggest</b>			
<input checked="" type="checkbox"/> Contaminant concentrations are declining			
<input checked="" type="checkbox"/> Groundwater plume is effectively contained <i>VOC concentrations in wells in the vicinity of the PGRS extraction well have decreased to below the cleanup levels in the OU3 ROD, such that operation of the PGRS is not required to maintain containment of the groundwater plume.</i>			
<b>E. Monitored Natural Attenuation</b>			
<b>1. Monitoring Wells</b> (natural attenuation remedy)		<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs maintenance		
Remarks _____			

*Operable Unit 3*

<b>X. OTHER REMEDIES</b>
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. <i>(see additional remedy component below.)</i>
<b>A. Institutional Controls</b>
<u><i>The MDH maintains a Special Well Construction Area and the OU1 Alternative Water Supply and Well Abandonment Program was expanded to cover the OU3 groundwater plume. (See OU1 Site Inspection for discussion of these remedy components.)</i></u>
<b>XI. OVERALL OBSERVATIONS</b>
<b>A. Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <u><i>The OU3 groundwater recovery system (PGRS) is intended to provide containment of the plume (prevent any plume migration beyond the pumping well, NBM#13). However, VOC concentrations in wells the vicinity of the NBM#13 have decreased to below the cleanup levels in the OU3 ROD, such that operation of the PGRS is not required to maintain containment of the groundwater plume. The PGRS is being maintained in standby status.</i></u>
<b>B. Adequacy of O&amp;M</b>
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u><i>O&amp;M procedures are adequate to ensure the short- and long-term protectiveness of the remedy. The PGRS is being maintained in standby status.</i></u>
<b>C. Early Indicators of Potential Remedy Problems</b>
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. <u><i>None.</i></u>
<b>D. Opportunities for Optimization</b>
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u><i>None.</i></u>

## O&M COST BREAKDOWN FOR OPERABLE UNIT 3 (PGRS)

	1999	2000	2001	2002	2003
<b>MATERIALS AND SUPPLIES</b>					
General Materials	\$724	\$1,559	\$1,772	\$34	\$206
Chemicals	\$10,413	\$4,102	\$2,725	\$0	\$0
Small Equipment	\$0	\$0	\$0	\$0	\$0
<b>TOTAL</b>	<b>\$11,137</b>	<b>\$5,661</b>	<b>\$4,497</b>	<b>\$34</b>	<b>\$206</b>
<b>CONTRACTUAL SERVICES</b>					
Telephone	\$1,362	\$1,912	\$1,966	\$2,033	\$1,674
Utility Charges	\$37,237	\$29,636	\$28,862	\$8,127	\$11,979
Printing/Publishing	\$0	\$0	\$0	\$0	\$0
Waste Removal	\$0	\$0	\$0	\$0	\$0
Memberships	\$0	\$0	\$0	\$0	\$0
Training	\$0	\$0	\$0	\$0	\$0
Travel	\$0	\$0	\$0	\$0	\$0
Maint. of Buildings & Grounds	\$19,278	\$14,083	\$20,073	\$1,523	\$1,574
Other Services					
Insurance	\$1,200	\$1,200	\$1,300	\$1,535	\$1,800
DNR App. Fee	\$0	\$2,151	\$1,088	\$691	\$0
SAC	\$10,450	\$0	\$0	\$0	\$0
Sanitary Sewer	\$1,662	\$8,535	\$4,840	\$130	\$2,411
Miscellaneous	\$15	\$73	\$159	\$137	\$100
Carbon Contracts	\$0	\$0	\$0	\$0	\$0
City Services					
Administration	\$13,100	\$10,600	\$17,700	\$3,400	\$1,750
Operations	\$73,646	\$65,150	\$46,821	\$14,603	\$5,719
Engineering	\$48,640	\$42,074	\$45,009	\$26,729	\$2,543
Legal/Professional Services	\$1,928	\$7,391	\$55,083	\$16,099	\$449
Auditing Services	\$0	\$0	\$1,280	\$370	\$513
Capital Outlay	\$0	\$0	\$0	\$0	\$0
Corrections					
<b>TOTAL</b>	<b>\$208,518</b>	<b>\$182,805</b>	<b>\$224,181</b>	<b>\$75,377</b>	<b>\$30,513</b>
<b>TOTAL</b>	<b>\$219,655</b>	<b>\$188,466</b>	<b>\$228,678</b>	<b>\$75,411</b>	<b>\$30,720</b>
<b>Projects:</b>					
Construction	\$0	\$0	\$0	\$0	\$0
Engineering	\$0	\$0	\$0	\$0	\$0
<b>TOTAL</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>GRAND TOTAL</b>	<b>\$219,655</b>	<b>\$188,466</b>	<b>\$228,678</b>	<b>\$75,411</b>	<b>\$30,720</b>

## **A.10 Grenade Range and Outdoor Firing Range**

## Five-Year Review Site Inspection Checklist

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable".)

I. SITE INFORMATION			
Site name: <i>Grenade Range and Outdoor Firing Range New Brighton/Arden Hills Superfund Site</i>		Date of inspection: <i>March 2, 2004</i>	
Location and region: <i>Arden Hills, MN, Region 5</i>		USEPA ID: <i>MN 7213820908</i>	
Agency, office or company leading the Five-Year Review: <i>U.S. Army</i>		Weather/temperature:	
Remedy Includes: (Check all that apply) <i>(The items checked below apply to both sites, except as noted)</i> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <input checked="" type="checkbox"/> Landfill cover/containment <i>(Outdoor Firing Range only, cover is planned but not yet constructed)</i>  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input checked="" type="checkbox"/> Other <u><i>Soil excavation, on-site treatment, and off-site disposal (remediation has been completed).</i></u> </div> <div style="width: 50%;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls           </div> </div>			
<i><b>Note:</b> These two sites were completed as removal actions and were not included in the OU2 ROD. These sites have been included in the Five-Year Review process since, after removal action implementation, each of these sites has contaminants remaining at the site above levels that would allow for unlimited use and unrestricted exposure (inclusion of such sites in Five-Year reviews is USEPA policy). Completion of closeout reports at both of these sites has triggered the reviews of these two removal actions.</i>			
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			
II. INTERVIEWS (Check all that apply)			
1. Site Managers			
<b><i>Protective Soil Cover O&amp;M (when constructed):</i></b> a. O&M site manager <u><i>Dave Hamernick, Nat'l Guard</i></u> <u><i>AHATS Coordinator</i></u> <u><i>March 2, 2004</i></u> <div style="display: flex; justify-content: space-between;"> <div style="width: 40%;">               Name                Interviewed    <input checked="" type="checkbox"/> at site    <input type="checkbox"/> at office    <input type="checkbox"/> by phone                Problems, suggestions;    <input type="checkbox"/> Report attached             </div> <div style="width: 60%;">               Title                Phone no.    <u><i>(651) 775-5017</i></u> </div> </div>			
<b><i>Soil Remediation and Outdoor Firing Range Cover Construction:</i></b> b. Site manager <u><i>Jim Persoon, Alliant Techsystem</i></u> <u><i>Project Manager</i></u> <u><i>N/A</i></u> <div style="display: flex; justify-content: space-between;"> <div style="width: 40%;">               Name                Interviewed    <input type="checkbox"/> at site    <input type="checkbox"/> at office    <input type="checkbox"/> by phone                Problems, suggestions;    <input type="checkbox"/> Report attached             </div> <div style="width: 60%;">               Title                Phone no.    <u><i>(763) 744-5690</i></u> </div> </div>			
2. O&M staff <u><i>N/A</i></u> <div style="display: flex; justify-content: space-between;"> <div style="width: 40%;">               Name                Interviewed    <input type="checkbox"/> at site    <input type="checkbox"/> at office    <input type="checkbox"/> by phone                Problems, suggestions;    <input type="checkbox"/> Report attached             </div> <div style="width: 60%;">               Title                Phone no.    _____             </div> </div>			

**Grenade Range and Outdoor Firing Range**

3. Local regulatory authorities and response agencies (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency N/A  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.
------	-------	------	-----------

Problems; suggestions; ☐ Report attached \_\_\_\_\_

4. Other interviews (optional) ☐ Report attached.

N/A



**Grenade Range and Outdoor Firing Range**

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
<b>1. O&amp;M Documents</b>			
O&M manual ( <i>Note 1</i> )	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
As-built drawings	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Maintenance logs	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks <u><i>1) The Land Use Control Implementation Plan (LUCIP) contains O&amp;M procedures for protective soil covers, which will apply to the Outdoor Firing Range cover, when constructed. An update of the LUCIP was in progress at the end of FY 2003.</i></u>			
<b>2. Site Specific Health and Safety Plan</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Contingency plan/emergency response plan	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks _____			
<b>3. O&amp;M and OSHA Training Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Remarks _____			
<b>4. Permits and Service Agreements</b>			
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input checked="" type="checkbox"/> Other permits ( <i>Note 1</i> )	<input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks <u><i>1) Excavated soils that have been treated (stabilized) have been sent to permitted landfills for disposal.</i></u>			
_____			
_____			
<b>5. Gas Generation Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>6. Settlement Monument Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks _____			
<b>7. Groundwater Monitoring Records</b> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A			
Remarks <u><i>Groundwater monitoring results are documented in the TCAAP Fiscal Year 2003 Annual Performance Report.</i></u>			
<b>8. Leachate Extraction Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A			
Remarks: _____			
<b>9. Discharge Compliance Records</b>			
<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Water (effluent)	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks _____			
<b>10. Daily Access/Security Logs</b>			
<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks <u><i>TCAAP is a secured facility with restricted access.</i></u>			

## Grenade Range and Outdoor Firing Range

IV. O&M COSTS																																											
<b>1. O&amp;M Organization</b> <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> State in-house  <input type="checkbox"/> PRP in-house  <input type="checkbox"/> Federal Facility in-house  <input type="checkbox"/> Other <u>N/A</u> (<i>Outdoor Firing Range cover has not been constructed</i>) </div> <div> <input type="checkbox"/> Contractor for State  <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Contractor for Federal Facility </div> </div>																																											
<b>2. O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A ( <i>Outdoor Firing Range cover has not been constructed</i> ) <input type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate _____ <input type="checkbox"/> Breakdown attached  <div style="text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">From _____</td> <td style="width: 15%;">To _____</td> <td style="width: 35%;">_____</td> <td style="width: 35%; text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td>_____</td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> </table>				From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		From _____	To _____	_____	<input type="checkbox"/> Breakdown attached	Date	Date	Total cost	
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From _____	To _____	_____	<input type="checkbox"/> Breakdown attached																																								
Date	Date	Total cost																																									
<b>3. Unanticipated or Unusually High O&amp;M Costs During Review Period</b> Describe costs and reasons: <u>N/A</u> ( <i>Outdoor Firing Range cover has not been constructed</i> ) <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>																																											

*Grenade Range and Outdoor Firing Range*

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b>		<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>			
1. <b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>TCAAP is a secured facility with restricted access. Fences and locked gates are in good condition.</u>			
<b>B. Other Access Restrictions</b>			
1. <b>Signs and other security measures</b> <input type="checkbox"/> Location shown on map <input type="checkbox"/> N/A Remarks <u>(see above comments on fencing)</u>			
<b>C. Institutional Controls (ICs)</b>			
1. <b>Implementation and Enforcement</b>  <i>ICs: 1) Prohibit activities that would exceed the exposure scenario under which the site was cleaned up (an "industrial use scenario" was utilized).</i> <i>2) Prohibit activities that would disturb protective soil cover at the Outdoor Firing Range (when constructed).</i>  <div style="display: flex; justify-content: space-between;"> <div>           Site conditions imply ICs not properly implemented            Site conditions imply ICs not being fully enforced         </div> <div> <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No    <input type="checkbox"/> N/A  <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No    <input type="checkbox"/> N/A         </div> </div> Type of monitoring (e.g., self-reporting, drive by) <u>Inspection</u> Frequency <u>Annual</u> Responsible party/agency <u>National Guard</u> Contact <u>Dave Hamernick, Nat'l Guard</u> <u>AHATS Coordinator</u> <u>(651) 775-5017</u> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>Name</span> <span>Title</span> <span>Phone no.</span> </div> <div style="display: flex; justify-content: space-between;"> <div>           Reporting is up-to-date            Reports are verified by the lead agency             Specific requirements in deed or decision documents have been met            Have there been violations         </div> <div> <input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> N/A  <input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> N/A   <input checked="" type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> N/A  <input type="checkbox"/> Yes    <input checked="" type="checkbox"/> No    <input type="checkbox"/> N/A         </div> </div> Other problems or suggestions <input type="checkbox"/> Report attached			
2. <b>Adequacy</b> <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A Remarks _____			
<b>D. General</b>			
1. <b>Vandalism/trespassing</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident Remarks _____			
2. <b>Land use changes onsite</b> <input type="checkbox"/> N/A Remarks <u>In 2001, approximately 1541 acres of TCAAP were reassigned to the National Guard Bureau, which utilizes this property for military training purposes (the property is still under federal control).</u>			
3. <b>Land use changes offsite</b> <input checked="" type="checkbox"/> N/A Remarks _____			

*Grenade Range and Outdoor Firing Range*

VI. GENERAL SITE CONDITIONS			
A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. Roads damaged	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads Adequate	<input type="checkbox"/> N/A
Remarks _____			
B. Other Site Conditions			
Remarks <u>None</u>			
VII. LANDFILL COVERS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Outdoor Firing Range cover has not been constructed)			
VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
IX. GROUNDWATER/SURFACE WATER REMEDIES <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
X. OTHER REMEDIES			
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. (See additional remedy components below.)			
A. Soil Remediation			
<p>What is the current status of soil remediation:</p> <p>Grenade Range <u>Remediation is complete. 2,179 cubic yards of metals-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. The Closeout Report for the Grenade Range has been approved, but final consistency has not yet been provided.</u></p> <p>Outdoor Firing Range <u>Remediation is complete. 990 cubic yards of metals-contaminated soil were excavated, treated (stabilized), and transported to a permitted off-site disposal facility. The Closeout Report for the Outdoor Firing Range has been approved, but final consistency has not yet been provided. Also, a protective soil cover will be constructed over a portion of the Outdoor Firing Range (1900-Yard Range) that was impacted with polynuclear aromatic hydrocarbons (PAHs). A work plan for construction of the soil cover was approved near the end of FY 2003, and construction of the cover is anticipated to occur in early FY 2004. Construction of the soil cover will be documented in an addendum to the Outdoor Firing Range Closeout Report.</u></p> <p>Describe any significant problems that have occurred during remediation activities, and whether they will require changes to the remedial design.</p> <p><u>None.</u></p>			
B. Groundwater Monitoring (Grenade Range only)			
Data are routinely submitted on time	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Data are of acceptable quality	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Data suggest that no impacts to groundwater have occurred (Note 1)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Remarks <u>Monitoring was initiated in FY 2001, and will tentatively end in FY 2004.</u>			
<u>1) There were a few detections slightly above background levels in FY 2003, which may be representative of the variability surrounding background levels. FY 2004 results will provide confirmation.</u>			

*Grenade Range and Outdoor Firing Range*

XI. OVERALL OBSERVATIONS	
<b>A. Implementation of the Remedy</b>	<p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p><u><i>For both sites, the remedy that has been selected is intended to remove soils that are contaminated above the cleanup goals, restoring the site's availability for industrial use. The soil excavation, treatment, and off-site disposal remedy has effectively accomplished this objective. Remediation has been completed at both sites. Due to the discovery of PAHs at the 1900-Yard Range of the Outdoor Firing Range, construction of a protective soil cover was selected as an additional remedy as a means of preventing access to the contaminants. The protective soil cover, in conjunction with land use controls, will effectively accomplish this added objective.</i></u></p>
<b>B. Adequacy of O&amp;M</b>	<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u><i>The protective soil cover at the Outdoor Firing Range is anticipated to be constructed in early FY 2004. O&amp;M procedures will be limited to maintaining the cautionary signs around the perimeter of the protective soil cover (the signs are also anticipated to be installed in early FY 2004). These signs will help ensure the short- and long-term protectiveness of the remedy by helping to prevent prohibited activities from occurring and helping to prevent disturbance of protective soil cover. O&amp;M will also include repair of any damage to a protective soil cover; if such damage were to occur.</i></u></p>
<b>C. Early Indicators of Potential Remedy Problems</b>	<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u><i>None.</i></u></p>
<b>D. Opportunities for Optimization</b>	<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u><i>None.</i></u></p>

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## Appendix B

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### Community Notices and Responsiveness Summary

## **B.1 Newspaper Notices**



Ramsey

**Sun Focus**  
**AFFIDAVIT OF PUBLICATION**

STATE OF MINNESOTA)

ss.

COUNTY OF HENNEPIN)

Richard Hendrickson, being duly sworn on an oath states or affirms that he is the Chief Financial Officer of the newspaper known as Sun Focus, and has full knowledge of the facts which are stated below.

(A) The newspaper has complied with all of the requirements constituting qualification as a qualified newspaper, as provided by Minn. Stat. § 331A.02, § 331A.07, and other applicable laws, as amended.

(B) The printed public notice that is attached, was cut from the columns of said newspaper, and was printed and published once each week, for 1 successive week(s); it was first published on Thursday, the 19 day of February, 2004, and was thereafter printed and published on every Thursday to and including Thursday, the \_\_\_\_\_ day of \_\_\_\_\_, 2004; and printed below is a copy of the lower case alphabet from A to Z, both inclusive, which is hereby acknowledged as being the size and kind of type used in the composition and publication of the notice:

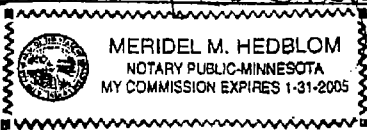
abcdefghijklmnopqrstuvwxyz

By: *Richard Hendrickson*

Title: CFO

Subscribed and sworn to or affirmed before me  
on this 27 day of Feb, 2004.

*Meridel M. Hedblom*



Notary Public

**RATE INFORMATION**

- (1) Lowest classified rate paid by commercial users for comparable space \$ 2.55 per line
- (2) Maximum rate allowed by law for the above matter \$ 6.20 per line
- (3) Rate actually charged for the above matter \$ .99 per line

**LEGALS**

**Public Notice**

(Official Publication)  
Public Notice of Five-Year Review  
New Brighton/Arden Hills  
Superfund Site  
Ramsey County, Minnesota

The U.S. Army, in conjunction with the U.S. Environmental Protection Agency (EPA) and Minnesota Pollution Control Agency (MPCA), is conducting a five-year review of the New Brighton/Arden Hills Superfund Site. The Site includes the Twin Cities Army Ammunition Plant (TCAAP). The Site was placed on the National Priorities List in 1983, and includes soil and shallow groundwater contamination on TCAAP, and deep groundwater contamination both on and off TCAAP. Remedies were selected through Records of Decision in 1992, 1993, and 1997. For soil, the remedies include soil vapor extraction, excavation, stabilization, and off-site disposal, construction of soil covers, and land use controls. For groundwater, the remedies principally consist of pump-and-treat systems. It is expected that a draft copy of the Five-Year Review Report will be available for public comment in mid-May 2004. For more information, contact:

Mike Fr  
U.S. Army, TCAAP  
(651) 633-2301 ext. 1661  
Jim Barone  
EPA Region 5  
(612) 253-5577  
Meridel Hedblom  
MPCA  
(651) 296-7788  
February 19, 2004 F-3 & 4 USARMY

# Affidavit of Publication

State of Minnesota } SS  
County of Ramsey }

Keri Solseth, being duly sworn, on oath, says that he/she is the publisher or authorized agent and employee of the publisher of the newspaper known as NEW BRIGHTON BULLETIN, and has full knowledge of the facts which are stated below:

(A) The newspaper has complied with all of the requirements constituting qualification as a qualified newspaper, as provided by Minnesota Statute 331A.02, 331A.07, and other applicable laws, as amended.

(B) The printed PUBLIC NOTICE

which is attached was cut from the columns of said newspaper, and was printed and published once each week, for 1 successive weeks; it was first published on WED., the 18<sup>th</sup> day of FEB., 20 04, and was thereafter printed and published on every \_\_\_\_\_ to and including \_\_\_\_\_, the \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_; and printed below is a copy of the lower case alphabet from A to Z, both inclusive, which is hereby acknowledged as being the size and kind of type used in the composition and publication of the notice:

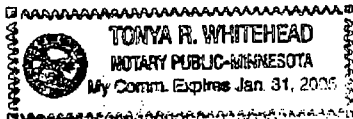
\*ABCDEFGHIJKLMNPOQRSTUVWXYZ  
\*ABCDEFGHIJKLMNPOQRSTUVWXYZ  
\*abcdefghijklmnpqrstuvwxyz

BY: Keri Solseth  
TITLE ACCOUNTING ASSOCIATE

Subscribed and sworn to before me on  
this 18<sup>th</sup> day of FEB., 20 04

Tonya R. Whitehead  
Notary Public

\*Alphabet should be in the same size and kind of type as the notice.



## RATE INFORMATION

- (1) Lowest classified rate paid by commercial users for comparable space.....\$24.00 per col. inch
- (2) Maximum rate allowed by law for the above matter.....\$20.49 per col. inch
- (3) Rate actually charged for the above matter .....\$            per col. inch

#### LEGAL NOTICE

Public Notice of Five-Year Review  
New Brighton/Arden Hills Superfund Site  
Ramsey County, Minnesota  
The U.S. Army, in conjunction with the U.S. Environmental Protection Agency (EPA) and Minnesota Pollution Control Agency (MPCA), is conducting a five-year review of the New Brighton/Arden Hills Superfund Site. The Site includes the Twin Cities Army Ammunition Plant (TCAAP). The Site was placed on the National Priorities List in 1983, and includes soil and shallow groundwater contamination on TCAAP and deep groundwater contamination both on and off TCAAP. Remedies were selected through Records of Decision in 1992, 1993, and 1997. For soil, the remedies include soil vapor extraction, excavation, stabilization, and off-site disposal, construction of soil covers, and land use controls. For groundwater, the remedies principally consist of pump-and-treat systems. It is expected that a draft copy of the Five-Year Review Report will be available for public comment in mid-May 2004. For more information, contact:

Mike Fix

U.S. Army, TCAAP

(651) 633-2301 ext. 1661

Tom Barounis

EPA Region V

(312) 353-5577

Dagmar Romano

MPCA

(651) 296-7776

(Bulletin: Feb. 18, 2004)

STATE OF MINNESOTA )  
 )ss.  
COUNTY OF HENNEPIN )

AFFIDAVIT OF PUBLICATION

Linda St. Clair, being duly sworn, on oath says She is and during all times herein stated has been an employee of the Star Tribune, a subsidiary of McClatchy Company, 425 Portland Avenue, Minneapolis, Minnesota 55488, publisher and printer of the Star Tribune newspaper (the "Newspaper"), published 7 days a week, and has full knowledge of the facts herein stated as follows:

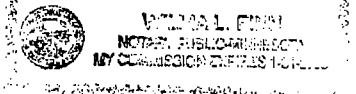
1. (a) The Newspaper is printed in the English language in newspaper format and in column and sheet form equivalent in printed space to at least 1,000 square inches;  
(b) The Newspaper is printed daily and distributed at least five days each week;  
(c) In at least half of its issues each year, the Newspaper has no more than 75 percent of its printed space comprised of advertising material and paid public notices. In all of its issues each year, the Newspaper has not less than 25 percent of its news columns devoted to news of local interest to the community which it purports to serve. Not more than 25 percent of the Newspaper's non-advertising column inches in any issue duplicates any other publication;  
(d) The Newspaper is circulated in the local public corporation which it purports to serve, and has at least 500 copies regularly delivered to paying subscribers;  
(e) The Newspaper has its known office of issue established in either the county in which it lies, in whole or in part, the local public corporation which the Newspaper purports to serve, or in an adjoining county;  
(f) The Newspaper files a copy of each issue immediately with the state historical society;  
(g) The Newspaper is made available at single or subscription prices to any person, corporation, partnership, or other unincorporated association requesting the Newspaper and making the applicable payment;  
(h) The Newspaper has complied with all the foregoing conditions for at least one year immediately preceding the date of the notice publication which is the subject of the Affidavit; and  
(i) Between September 1 and December 31 of each year, the Newspaper publishes and submits to the secretary of state, along with a filing fee of \$25, a sworn United States Post Office periodical class statement of ownership and circulation.
2. The printed copy of the matter attached hereto (the "Notice") was cut from the columns of the Newspaper and was printed and published in the English language, on the following days and dates: Sunday, February 15, 2004.
3. Except as otherwise directed by a particular statute requiring publication of a public notice, the Notice was printed in a type face no smaller than six point with a lowercase alphabet of 90 point.
4. The fees for publication are as follows:
  - (a) The maximum rate currently allowed by law for publication of a public notice in the Newspaper is \$4.50;
  - (b) The lowest classified rate currently paid by commercial users for comparable space in the Newspaper is \$8.30; and;
  - (c) The rate actually charged for publication of the Notice was \$216.00

Linda St. Clair

Subscribed and sworn to before me  
on February 17, 2004

William A. Linn

Notary Public



Tecumseh/ Wenck Installation  
Lisa Haberman  
4700 Highway 10 Ste F  
Arden Hills, MN 55112

2465687  
48 lines  
class 203

Five-Year Review  
New Brighton/Arden Hills  
Superfund Site  
Ramsey County, Minnesota

The U.S. Army, in conjunction with the U.S. Environmental Protection Agency (EPA) and Minnesota Pollution Control Agency (MPCA), is conducting a five-year review of the New Brighton/Arden Hills Superfund Site. The Site includes the Twin Cities Army Ammunition Plant (TCAAP). The Site was placed on the National Priorities List in 1983, and includes soil and shallow groundwater contamination on TCAAP, and deep groundwater contamination, both on and off TCAAP. Remedies were selected through Records of Decision in 1992, 1993, and 1997. For soil, the remedies include soil vapor extraction, excavation, stabilization, and off-site disposal, construction of soil covers, and land use controls. For groundwater, the remedies principally consist of pump-and-treat systems. It is expected that a draft copy of the Five-Year Review Report will be available for public comment in mid-May 2004. For more information, contact:

Mike Fox  
U.S. Army, TCAAP  
(651) 633-2301, ext. 1661  
Tom Barounis  
EPA Region V  
(312) 352-5577  
Dagmar Romano  
MPCA  
(651) 296-7776

**Sun Focus**  
**AFFIDAVIT OF PUBLICATION**

STATE OF MINNESOTA)

ss.

COUNTY OF CARVER)

Richard Hendrickson, being duly sworn on an oath states or affirms that he is the Chief Financial Officer of the newspaper known as Sun Focus, and has full knowledge of the facts which are stated below.

(A) The newspaper has complied with all of the requirements constituting qualification as a qualified newspaper, as provided by Minn. Stat. § 331A.02, § 331A.07, and other applicable laws, as amended.

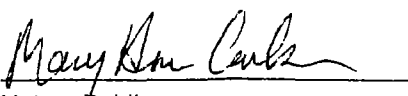
(B) The printed public notice that is attached, was cut from the columns of said newspaper, and was printed and published once each week, for 1 successive week(s); it was first published on Thursday, the 6 day of May, 2004, and was thereafter printed and published on every Thursday to and including Thursday, the \_\_\_\_\_ day of \_\_\_\_\_, 2004; and printed below is a copy of the lower case alphabet from A to Z, both inclusive, which is hereby acknowledged as being the size and kind of type used in the composition and publication of the notice:

abcdefghijklmnopqrstuvwxyz

By: 

Title: CFO

Subscribed and sworn to or affirmed before me  
on this 10th day of May, 2004.

  
Notary Public



**RATE INFORMATION**

- (1) Lowest classified rate paid by commercial users    \$ 2.55 per line  
for comparable space
- (2) Maximum rate allowed by law for the above matter    \$ 6.20 per line
- (3) Rate actually charged for the above matter            \$ .99 per line

**LEGALS**

**Public Notice**

(Official Publication)  
Legal Notice

Public Notice of  
Five-Year Review  
New Brighton/Arden Hills Superfund Site  
Ramsey County, Minnesota

The U.S. Army, in conjunction with the U.S. Environmental Protection Agency (EPA) and Minnesota Pollution Control Agency (MPCA), is conducting a five-year review of the New Brighton/Arden Hills Superfund Site. The Site includes the Twin Cities Army Ammunition Plant (TCAAP). The Site was placed on the National Priorities List in 1983, and includes soil and shallow groundwater contamination on TCAAP, and deep groundwater contamination both on- and off-TCAAP. Remedies were selected through Records of Decision in 1982, 1993, and 1997. For soil, the remedies include soil vapor extraction, excavation, stabilization, and off-site disposal; construction of soil covers; and land use controls. For groundwater, the remedies principally consist of pump-and-treat systems. A draft copy of the Five-Year Review Report will be available for public comment on May 5, 2004, and comments will be accepted through June 4, 2004. The Report can be viewed at TCAAP during normal business hours. To arrange viewing or submit written comments, contact Mike Fix, U.S. Army, TCAAP at (651) 633-2301, ext. 1661. Questions can also be directed to Tom Barounis, EPA Region V at (312) 353-6577 or Dagmar Romano, MPCA at (651) 296-7776.

(May 6, 2004) 12/5-year review

# Affidavit of Publication

State of Minnesota } SS  
County of Ramsey }

Keri Solseth, being duly sworn, on oath, says that  
he/she is the publisher or authorized agent and employee of the publisher of the newspaper known  
as NEW BRIGHTON BULLETIN, and has full knowledge of the facts which are  
stated below:

(A) The newspaper has complied with all of the requirements constituting qualification as a qualified  
newspaper, as provided by Minnesota Statute 331A.02, 331A.07, and other applicable laws, as amended.

(B) The printed PUBLIC NOTICE

which is attached was cut from the columns of said newspaper, and was printed and published once each  
week, for 1 successive weeks; it was first published on WED., the 5<sup>TH</sup> day of  
MAY, 20 04, and was thereafter printed and published on every \_\_\_\_\_ to and including  
\_\_\_\_\_, the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_; and printed below is a copy of the lower case alphabet  
from A to Z, both inclusive, which is hereby acknowledged as being the size and kind of type used in the  
composition and publication of the notice:

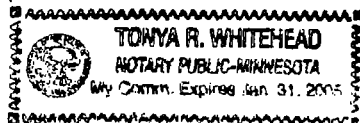
\*ABCDEFGHIJKLMNPOQRSTUVWXYZ  
\*ABCDEFGHIJKLMNPOQRSTUVWXYZ  
\*abcdefghijklmnopqrstuvwxyz

BY: Keri Solseth  
TITLE ACCOUNTING ASSOCIATE

Subscribed and sworn to before me on  
this 5<sup>TH</sup> day of MAY, 20 04

Tonya R Whitehead  
Notary Public

\*Alphabet should be in the same size and kind of type as the notice.



## RATE INFORMATION

- (1) Lowest classified rate paid by  
commercial users for comparable space .....\$24.00 per col. inch
- (2) Maximum rate allowed by law for the above matter.....\$20.49 per col. inch
- (3) Rate actually charged for the above matter .....\$        per col. inch



**PUBLIC NOTICE OF  
FIVE-YEAR REVIEW  
NEW BRIGHTON/ARDEN HILLS  
SUPERFUND SITE**

**RAMSEY COUNTY, MINNESOTA**

The U.S. Army, in conjunction with the U.S. Environmental Protection Agency (EPA) and Minnesota Pollution Control Agency (MPCA), is conducting a five-year review of the New Brighton/Arden Hills Superfund Site. The Site includes the Twin Cities Army Ammunition Plant (TCAAP). The Site was placed on the National Priorities List in 1983, and includes soil and shallow groundwater contamination on TCAAP, and deep groundwater contamination both on and off TCAAP. Remedies were selected through Records of Decision in 1992, 1993, and 1997. For soil, the remedies include soil vapor extraction, excavation, stabilization, and off-site disposal; construction of soil covers, and land use controls. For groundwater, the remedies principally consist of pump-and-treat systems. A draft copy of the Five-Year Review Report will be available for public comment on May 5, 2004, and comments will be accepted through June 4, 2004. The Report can be viewed at TCAAP during normal business hours. To arrange viewing or submit written comments, contact Mike Fix, U.S. Army, TCAAP at (651) 533-2901, ext. 1661. Questions can also be directed to Tom Bafounis, EPA Region V at (312) 353-5577 or Dagmar Romano, MPCA at (651) 296-7776.

(Bulletin: May 5, 2004)

STATE OF MINNESOTA )  
 )ss.  
COUNTY OF HENNEPIN )

AFFIDAVIT OF PUBLICATION

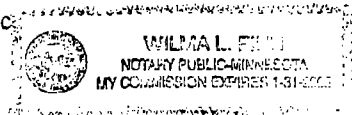
Linda St. Clair, being duly sworn, on oath says She is and during all times herein stated has been an employee of the Star Tribune, a subsidiary of McClatchy Company, 425 Portland Avenue, Minneapolis, Minnesota 55488, publisher and printer of the Star Tribune newspaper (the "Newspaper"), published 7 days a week, and has full knowledge of the facts herein stated as follows:

1. (a) The Newspaper is printed in the English language in newspaper format and in column and sheet form equivalent in printed space to at least 1,000 square inches;
  - (b) The Newspaper is printed daily and distributed at least five days each week;
  - (c) In at least half of its issues each year, the Newspaper has no more than 75 percent of its printed space comprised of advertising material and paid public notices. In all of its issues each year, the Newspaper has not less than 25 percent of its news columns devoted to news of local interest to the community which it purports to serve. Not more than 25 percent of the Newspaper's non-advertising column inches in any issue duplicates any other publication;
  - (d) The Newspaper is circulated in the local public corporation which it purports to serve, and has at least 500 copies regularly delivered to paying subscribers;
  - (e) The Newspaper has its known office of issue established in either the county in which it lies, in whole or in part, the local public corporation which the Newspaper purports to serve, or in an adjoining county;
  - (f) The Newspaper files a copy of each issue immediately with the state historical society;
  - (g) The Newspaper is made available at single or subscription prices to any person, corporation, partnership, or other unincorporated association requesting the Newspaper and making the applicable payment;
  - (h) The Newspaper has complied with all the foregoing conditions for at least one year immediately preceding the date of the notice publication which is the subject of the Affidavit; and
  - (i) Between September 1 and December 31 of each year, the Newspaper publishes and submits to the secretary of state, along with a filing fee of \$25, a sworn United States Post Office periodical class statement of ownership and circulation.
2. The printed copy of the matter attached hereto (the "Notice") was cut from the columns of the Newspaper and was printed and published in the English language, on the following days and dates: Sunday, May 2, 2004.
  3. Except as otherwise directed by a particular statute requiring publication of a public notice, the Notice was printed in a type face no smaller than six point with a lowercase alphabet of 90 point.
  4. The fees for publication are as follows:
    - (a) The maximum rate currently allowed by law for publication of a public notice in the Newspaper is \$4.50;
    - (b) The lowest classified rate currently paid by commercial users for comparable space in the Newspaper is \$8.30; and;
    - (c) The rate actually charged for publication of the Notice was \$229.50

Subscribed and sworn to before me  
on May 12, 2004

Wilma L. Fenn

Notary Public



Tecumseh Wenck Installation  
Lisa Haberman  
4700 Highway 10 Ste F  
Arden Hills, MN 55112

2992823  
51 lines  
class 203

**PUBLIC NOTICE OF  
Five-Year Review  
New Brighton/Arden Hills  
Superfund Site  
Ramsey County, Minnesota**

The U.S. Army, in conjunction with the U.S. Environmental Protection Agency (EPA) and Minnesota Pollution Control Agency (MPCA), is conducting a five-year review of the New Brighton/Arden Hills Superfund Site. The Site includes the Twin Cities Army Ammunition Plant (TCAAP). The Site was placed on the National Priorities List in 1989 and includes soil and shallow groundwater contamination on TCAAP and deep groundwater contamination both on- and off-TCAAP. Remedies were selected through Records of Decision in 1992, 1993, and 1997. For soil, the remedies include soil vapor extraction, excavation, stabilization, and off-site disposal; construction of soil covers; and land use controls. For groundwater, the remedies principally consist of pump-and-treat systems. A draft copy of the Five-Year Review Report will be available for public comment on May 5, 2004, and comments will be accepted through June 4, 2004. The Report can be viewed at TCAAP during normal business hours. To arrange viewing or submit written comments, contact Mike Fix, U.S. Army, TCAAP at (651) 633-2301, ext. 1661. Questions can also be directed to Tom Barounis, EPA Region V at (312) 353-5577 or Dagmar Romano, MPCA at (651) 296-7778.

## **B.2 Responses to Public Comments**

**Responses to Comments by Dr. Christine Ziebold dated June 14,  
2004 on the "Five year Review Report of the Final Remedy for the  
New Brighton / Arden Hills Superfund Site"**

July 6, 2004

General Comments:

The 5 year review is mandated to check that remedies at a superfundsite protect humans and the environment per CERCLA section 121 c and EPA policy. I welcome the five year review because it is an opportunity to step back and examine the state of environmental cleanup at TCAAP. Clearly progress has been made in reducing TCE contamination. However, a large framework of assumptions about *what is protective* and *how the decision of protectiveness is made* is not explained. Consequently, the perspective of "protection" appears to be lost in this report. Are regulators looking for evidence of *health* or evidence of *harm*, to decide if humans and the environment are protected? It appears to me neither. The underlying concept of "risk analysis", the accepted practice of the times, claims safety by estimating the level of "acceptable" risk, but has a narrow focus. The Health Risk Limits (HRL's) or concentration of contaminants, that can be consumed daily for a lifetime with little or no risk to health, have continuously been adjusted to lower values. **[Response: The Five-Year Review was performed in accordance with USEPA guidance.]**

The 5 year review at TCAAP focuses on 3 areas, referred to as "record of decision". Yet sites with recent "removal actions" and sites where hazardous substances still remain in place, such as 1. Site C, 2. site I, site J and the 535 Primer Tracer Area and 3. Site F. This appears to defeat the purpose of the review. **[Response: Pages 1-1 and 1-2 explain what sites are not included in the five-year review and why. The reasons follow USEPA guidance. Site C soil is included in the review. Site I shallow groundwater is included in the review. Site F and Site J are not included because the regulatory agencies have concurred that contaminant levels allow unlimited use and unrestricted exposure. A remedy for the 535 Primer Tracer Area could not be evaluated for protectiveness since it hasn't been selected yet.]**

1. **Site C** needs to be in the review, because indeed "hazardous substances still remain in place" (As Be Mn Pb Sb Th). Since Army and regulators agreed to *keep* them in place and cap with soil a review if this remedy protects humans and the environment is relevant. To wait another 5 years to check for protectiveness would be untimely. **[Response: Site C soil is included in the review. As discussed in the report, the Army and regulators have not yet agreed on a revised remedy.]** A notable failure of protectiveness is the mobilization of lead during the phytoremediation project, a Clean Water Act violation, for which the state of Minnesota fined TCAAP to pay \$1,000,000 on 1/29 2002. Army and state settled on April 9, 2004 however, ie a full month before the 5 year review report was circulated, so "ongoing enforcement negotiations" should not be a

reason for Site C to be excluded from the report. **[Response: For the record, the basis of the violation, parties, and amount of the fine quoted by the commenter are inaccurate. With respect to the time period covered by the report, ultimately, the final report will likely be dated September 2004, but it is not possible to document all completed activities current to that time. It is necessary to pick an arbitrary cutoff date, and at the kickoff meeting, it was agreed that the cutoff would be September 30, 2003 (the end of FY 2003). This fact is documented on page 1-1 of the report.]**

2. Most prominently excluded from the review are the **sites with radioactive contamination**. Despite clear evidence of release of radioactive materials into the environment (air, water and soil), which EPA region 5 representatives have repeatedly denied, ATK's Building 502 and the 3 M's 535 PrimerTracer Area **[Response: 3M did not occupy Building 535]** are not part of the superfund. **[Response: It is a true statement that radioactive materials related to NRC licensed activities are regulated by the NRC, and not USEPA under CERCLA. Accordingly, these activities are not part of the CERCLA five-year review process.]** Regulators deferral to NRC has caused the public and even the regulators themselves to be mis-, under- or uninformed about the presence of hazardous substances still remaining in place. The extent of radionuclide contamination on and around TCAAP is basically unknown, because sampling for radionuclides per NRC, not an agency with an environmental mandate, has been confined to building 502. **[Response: The NRC has conducted sampling for radionuclides as part of the license decommissioning process for other license-holders at TCAAP, not just Building 502.]**

In a letter to Arden Hills City Council from February 20 2004 NRC acknowledges the extensive DU contamination in the interior of the former DU production areas, but states that "no radiological release to the exterior building in excess of NRC guidelines" (which is max 5000dpm/100cm<sup>2</sup> for fixed contamination) were found.

First, NRC's 5000dpm/100cm<sup>2</sup> decommissioning standard translates into radiation levels unacceptable by EPA (communication Rita Messing, MDH Environmental Health).

**[Response: Ms. Messing's memo, dated October 16, 2003, more carefully states that the 5000dpm standard, when translated by a rough calculation, could conceivably release radon gas and gamma radiation into the building at a higher level than EPA would find acceptable. However, she goes on to recognize that the issue is really how much radioactivity (radon gas and gamma) would there be left on average in the building after cleanup. She concluded that while NRC standards were used to drive the investigation and cleanup, both have been thorough, and the actual levels of cleanup obtained are consistent with EPA standards.]** Second, the outside of the building ie the exterior walls and perimeter soil of the DU room were also contaminated. This does not surprise, given the machining of at least 10,000lbs of DU per year for 12 years ( license for 1,5 million pounds ) with the occurrence of numerous DU fires as can be seen from the values below:

aste handling punch press room roof vents	308,00dpm/100 cm <sup>2</sup>
waste handling punch press room exterior walls	20,000/ 100cm <sup>2</sup>
Heat treat room roof vents	70,00 dpm/cm <sup>2</sup>

Heat treat room exterior walls	30,000dpm/cm2
Machining room roof vents	1.6 million dpm/cm2
Centrifuge cast room exterior walls	12,000 dpm/cm2
Rod cutoff room roof vents	350,000dpm/cm2
Exterior walls	19,000 dpm/cm2
Wastewater evaporator roof vents	58,000dpm/cm2
Wastewater exterior walls	25,000dpm/cm2
HEPA Vent System	7Million dpm/cm2
Reference: <i>Characterization Study Report for TCAAP, Duratek Inc 1997, page 34-41</i>	

Given these data past contamination of the air and storm water run-off is a given. I asked NRC why bio-indicators for past air contamination and Round Lake sediment have not been studied. In their January 5, 2004 letter NRC replied “did not believe... necessary”. **[Response: Issues related to NRC licenses are not part of the CERCLA process and are therefore, not included in the Five-Year Review.]**

Army should address conclusions of the 2002 report by The British Royal Society “The Health Hazards of Depleted Uranium Munitions, Part II” in that DU, can erode off military projectiles within 5-10 years. “Projections of exposure over the next 1,000 years ... indicated a gradual decline of the importance of contaminated dust, and a gradual increase in groundwater contamination over the next 100 years, before reaching a steady concentration between 100 and 1,000 years.” Recent publications have underscored the fact that uranium moves faster in soil than previously known or expected (Tetsu K. Tokunaga et al . Hexavalent Uranium Diffusion into Soils from Concentrated Acidic and Alkaline Solutions. Environ. Sci. Technol., 38 (11), 3056 –3062) **[Response: Issues related to NRC licenses are not part of the CERCLA process and are therefore, not included in the Five-Year Review.]**

All burn pits on TCAAP need to be checked for radioactivity particularly DU. A corroded 20-mm DU round was recently found during the investigation of a burn pit at Camp Edwards, Massachusetts. This despite Army officials insisted depleted uranium was “never fired”. (Cape Cod Times, June 5, 2004). Even Allianttech stated in its Environmental Assessment (ATK 2000) that the DU Room presented an “environmental risk situation”, a “potential public health hazard”. It is unclear what “environmental risk situation” Allianttech alludes to, since there has never been an analysis of potential threats posed by DU on TCAAP. The role reversal with ATK, the polluter, speaking of “environmental risk”, and EPA, the regulator, explaining that there is “no release of DU to the environment” is astonishing. **[Response: Issues related to NRC licenses are not part of the CERCLA process and therefore, not included in the Five-Year Review.]**

**3. Site F:** Dioxin was found and left in place: During the remedial investigation one soil sample showed a hit at 0.367ppb hepta-CDF with a Toxicity Equivalent concentration of 1.485ppb. This is above the 0.35ppb MPCA risk value for dioxin. How is effectiveness of protection evaluated? **[Response: After noting this apparent detection, the next**



sentence in the RI Report (1991) states that no dioxins or furans were detected in duplicate samples collected from the same sample location. This discrepancy, along with the fact that dioxins and furans were not detected in eleven other samples, led the report to conclude that dioxins were not a concern at Site F. Likewise, the USEPA Human Health Risk Assessment (1991) did not find dioxins to be a chemical of concern for Site F.]

Chapter 3.3 on history of contamination is uninformative. It also completely leaves out past air contamination (eg radionuclides due to burning of radioactive waste at 502). **[Response: Issues related to NRC licenses are not part of the CERCLA process and are therefore, not included in the Five-Year Review.]**

Page 3-4 : Site J , a portion of TCAAP's decrepit underground sewer system which leaked VOC's and DU into the surrounding soil was "cleaned" and closed out 1994. The sentence "no contamination was found" is therefore incorrect. **[Response: Contamination was present within the sewers, but investigation of adjacent soil and groundwater found no evidence of any release that poses a threat to human health.]** Significant amounts of residual radioactive contamination (35 pCi/g equal 20 times the background radiation) were left in place, up to 15 feet deep. **[Response: It is not clear what data this is referring to. The Site J Closure Report (1994) documents soil and groundwater sampling adjacent to the sewer lines and concludes that there were no concerns.]** Quite clearly the "background level" is not a "minimum remediation goal", unlike what is stated for OU2 on page 5-34.

Since no wells monitor underground water for depleted uranium there is no way of knowing if the remedy of "cleaning out" 10 years ago is still protective. Site I shallow and Deep Groundwater should not only be checked for TCE, but also DU . (Recommendations page 5-39). **[Response: The Site J Closure Report documents that groundwater was tested for gross alpha and beta activity and all results were below action criteria and probably represent background. This, along with the fact that radionuclides were not found to be a problem in soils, supports the decision that long-term monitoring is not required for radionuclides associated with Site J.]**

Table 3-1 "contaminants of concern at TCAAP" is incomplete. It does not mention lead for water on Site C (only soil) nor any radionuclides for site I and the 535 primer tracer area. Dioxins/furans are a contaminant of concern at Site F, as mentioned. **[Response: Explanations for each of these items has been addressed in previous comments and responses above.]**

Evaluations of soil vapor are not in the table: Site A, Site C 27 locations were positive for TCA, Site E: TCA was detected at 9 locations and TCE was detected at 3 locations in area E-1, Site 129-15: TCE, TCA, and BTEX were detected at this site which was not excavated but merely covered. **[Response: The soil vapor results cited are from the RI Report (1991), and the RI Report also documents soil samples that were collected to verify the soil vapor results. In most cases, the soil sample results had no**

**detections of VOCs, which led to the determination that these chemicals were not a concern in the soils at these sites. Site A is the exception, where soil testing confirmed the presence of VOCs in soils and they were retained as chemicals of concern.]**

The clean-up levels for the following groundwater contaminants in table 3-1 are above the new MDH Draft HRL's <sup>1</sup>:

Vinyl chloride 0.08ug/l for cancer HRL

Chloroform 20 ug/l for noncancer HRL

Antimony 2 ug/l for noncancer HRL

cis-1,2-Dichloroethylene 20 ug/l for noncancer HRL

**[Response: Until the revised HRLs are promulgated through rulemaking, they are not applicable as cleanup levels at TCAAP. The Report recommends tracking the HRL revision process for TCE and to re-evaluate cleanup levels if there is a change. The Report will be revised to expand this recommendation to other chemicals in addition to TCE.]**

Page 3-5 "Basis for taking action":

The "human health risk assessment" by EPA from 1991 is outdated for several reasons: It does not take children, the immunocompromised and the problem of exposure to mixtures into consideration and ignored radionuclides. EPA issued new children's cancer guidelines and health risk limits are being reviewed. The old "risk assessment" rested on the assumption of constant exposure throughout life and is not applicable to children, whose water intake rate/weight is higher than adult's. Minnesota Department of Health needs to be consulted and should reassess. **[Response: Opinion noted. No change is proposed to the Report.]**

Likewise the Army's "ecological assessment for terrestrial habitats" from 1991 is outdated. A lot more is known about endocrine disruption. The uranium concentration in terrestrial mammals endpoints such as deer (kidneys and bone) needs to be checked.

**[Response: Opinion noted. No change is proposed to the Report.]**

The "tier II Ecological Risk assessment report for aquatic sites" from 2003 showed that waterfowl and mammals are at risk for health effects from contaminants (Al, Pb, Sb, Ba, Cr and Cu) at all TCAAP lakes, so protection is not in effect.

The "risk assessment" focused on "NOAEL-based Hazard Quotients and LOAEL-based Hazard Quotients", ie lowest and highest data point at which no IMMEDIATE adverse effect was observed. This is an unacceptably narrow focus of what the layman would understand by risk, as it assumes that toxic effects are immediately observable. It does not consider endocrine disruption, the main effect of PCB's and Dioxin whose reproductive and developmental toxic effects are not immediately observable. It also did not consider the presence of DU, as it has not been sampled for. Given the past practice of melting/casting DU, incinerating mixed radioactive waste and the concomitant contamination of the exterior of building 502, and pollution of surface water, stream and lake sediments must be checked. In order to address off-range migration via distant

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<sup>1</sup> Minnesota Department of Health, Draft Health Risk Limits as of April 22, 2004, Groundwater Draft Rule <http://www.health.state.mn.us/divs/eh/groundwater/hrlgw/chemfinal.html>

aerial transport, akin to lead in particulate matter of contaminants, the Army should also examine beyond the property fence line. **[Response: Opinion noted. No change is proposed to the Report.]**

It is interesting that the 5year review, which is supposed to check that remedies at a superfundsite protect humans, does not make any reference to TCAAP's last public health assessment (ATSDR 1994) as outdated as it may be. **[Response: In 2003 the ATSDR considered a petition to perform another public health assessment. ATSDR, in conjunction with the MDH, has denied the request. The 1994 assessment will be added to the list of key events on page 2-1 of the Report.]**

**Specific comments:**

Page 4-1 Remedial action objectives:

HRL's have changed. See comment for table 3-1

**[Response: See response to previous comment on Table 3-1. The HRLs have not actually changed yet.]**

Page 4-4 Groundwater monitoring :

Figure 4-5 TCE isomers are cut off at 35W. Where does the 6 mile plume end? The whole extent of the plume should be shown.

**[Response: Past discussions with the MPCA and USEPA have led to the agreement to show groundwater contamination maps as far south as the vicinity of Highway 35. Further south, there is uncertainty with regards to potential multiple sources of VOCs in groundwater.]**

The Army to this date has not identified all offsite water wells. Comparing building permits with water bills needs to be done.

Groundwater sampling on and off site at numerous wells has been postponed since at least 2002. Many have not been sampled for six or eight years. Location and present use of some wells potentially used for domestic purposes have remained unknown.

**[Response: The Report does not state that "all" wells are included in the well inventory; rather, it says it is intended to include all wells in the study area. The regulatory-approved program includes reasonable efforts to identify wells within the study area, including coordination with the MDH well management section. In accordance with the program, the next "major" sampling event is scheduled for FY2005.]** Also, wells at Site I arguably the worst contaminated site on TCAAP have not had water level measurements for at least 8 to 15 years and the groundwater flow is considered "uncertain". **[Response: All but four wells at Site I have had water levels measured on an annual basis in recent years. Based on a USEPA comment to the FY2003 Annual Performance Report, water levels were measured at all of the Site I wells in June 2004.]**

In 2000 MDH's investigated 18 *known* offsite wells at 7 locations. The health risk limits used to determine safety *then* applied only to adults. Concentrations of TCE and its metabolites were still rising at two locations (Mengelkoch, Darling), despite the so far unexplained attenuation of the plume. MDH found dermal and inhalation exposure (not considered in EPA's 1991 risk assessment) at two locations: In one case (Mengelkoch) of 20 employees with metabolites of TCE. In the other case the owner (Wolff) of another well was not even aware of the contamination when purchasing the property hence children were exposed as the water was used for sprinkling. Possible dermal and inhalation exposure occurred at three further locations (Gross, Johnson, Sunset) where no "DO NOT DRINK or PLAY IN WATER" signs were mounted. Most problematic appears to be the well of the Big Ten Supper Club, the restaurant just opposite Highway 96 where all water samples used for cooking and drinking showed low levels of solvents. MDH called it "anomalous" since location and depth of the well would suggest a much higher solvent contamination. The well is so infrequently tested that MDH was unable to see a trend, recommending annual testing. **[Response: The Report will be revised to include discussion of the public health assessment conducted by the MDH in 2000.]** It is unclear, why one area of Rice Creek upgrade of TCAAP has increased TCE levels.<sup>2</sup> **[Response: The source of this historical detection upstream of TCAAP is unknown. Army has been voluntarily sampling Rice Creek at the point it enters TCAAP, and there have been no detections of TCE for many years, so it would appear that there is not an on-going source impacting Rice Creek upstream from TCAAP.]**

TCE is classified as possible human carcinogen. It can cause liver damage and birth defects such as anencephaly, spina bifida, cleft lip and cleft palate, related to prenatal exposure (ATSDR investigation at U.S. Marines' Camp Lejeune).

Evidence of harm due to TCE:

1. Since Minnesota does not have a birth defect registry, a rate increase could have remained completely unnoticed.
2. There is no standardized population based reporting system for liver diseases
3. A reporting system is available only for cancer, a maximum health impact and exceedingly rare event. The recently published seventh biennial Minnesota Cancer Surveillance System report shows that from 1995-1999 Ramsey County saw a 26 % increase in rate of cancer of the liver and bile duct for men and a 12 % increase in women. In the discussion of non-infectious risk factors only industrial exposure to vinyl chloride, thorium dioxide and drinking water contaminated with arsenic are mentioned, but not solvents, such as TCE.
4. MDH has done only one epidemiological review<sup>3</sup> re TCAAP and concluded that there were not enough data.

**[Response: In 2003 the ATSDR considered a petition to perform another public health assessment. ATSDR, in conjunction with the MDH, has denied the request.**

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<sup>2</sup> Human Health Risk Assessment New Brighton/Arden Hills Superfund Site including TCAAP, Ramsey County, Minnesota, Volume I (N25a), PRC Environmental Management Inc., April 1991

<sup>3</sup> Occurrence of liver cancers and leukemias in Arden Hills, New Brighton, and St. Anthony, Minnesota (1988-1992)

DU is a possible human carcinogen (bone cancer, leukemia and lymphoma) . It can cause kidney disease leading to renal failure, as well as neurological and immunological problems.

Evidence of harm due to DU:

1. There is no standardized population based reporting system for kidney, neurological or immunological diseases, ie any possible rate increase would be unnoticed.
2. The recent Minnesota Cancer Surveillance System report showed a 7% increase in leukemias for women in Ramsey County. Next to Benzene exposure radiation is the most established risk factor for leukemia. Additionally women had a 6% increase in cancer of the kidney and renal pelvis, a 6% increase in Non-Hodgkin's lymphoma, a 5 % increase in lung cancer and 3 % increase in breast cancer. These results are particularly interesting on the background of a 5% decrease in men's cancer rates of all sites and only a 0.5% increase for women during that 10-year period in Ramsey County.

**[Response: In 2003 the ATSDR considered a petition to perform another public health assessment. ATSDR, in conjunction with the MDH, has denied the request.]**

Page 4-6 Community involvement:

To say that "involvement was accomplished" is an overstatement.

The newspaper clippings show the notification "effort" in Appendix B and illustrate the problem: The cryptic, minuscule paragraph in font 8 or 9 lacks clarity in content and legibility. **[Response: Opinion noted. By USEPA guidance for five-year reviews, a public notice is not required. By having two public notices, a public comment period, and distributing a newsletter, the Army believes its community involvement efforts were reasonable.]**

The report itself is not written with the public in mind. It makes excessive use of passive tense and an unfortunate amount of acronyms and code language. An example of getting caught up in technical language which completely distorts the message is the sentence at the bottom of Page 4-11: "decreasing water quality trends suggest aquifer restoration" Lack of public response as stated in the report, should not come as a surprise. It was fullyintended in the Rice Creek Corridor transfer. This is tragic in light of the early transfer, as public input is needed. **[Response: Opinion noted. See response to MPCA comments on editing the sentence given as an example.]**

Page 4-12: The assumed routes of exposure at the time of the last risk assessment did not including dermal absorption and inhalation. I already mentioned TCE vapor measurement on TCAAP, however: the same has not been done in homes offsite according to MPCA.

**[Response: There is a layer of glacial till (referred to as Unit 2 in TCAAP reports) that is above the groundwater contamination off-TCAAP. This till has low permeability that minimizes the ability of water and soil gas to migrate through the layer. Hence, it is reasonable to expect that any TCE vapor volatilizing off the groundwater would not be able to migrate upward through the till and affect homes off-TCAAP.]**

Page 4-14, Chapter 4.5 "Issues": The degree of containment of the TCE plume aside what are the data that the remedy is protective, ie exposure is not taking place? **[Response: The data are the results of the well inventory testing as discussed on pages 4-3 and 4-4, and testing of the New Brighton municipal water supply system as discussed on pages 4-9 and 4-10.]**

The nature of the recommended ROD amendment is nowhere explained. I did not receive a report of a draft ROD amendment. **[Response: Additional explanation of the contemplated ROD amendment will be added. A draft ROD amendment has not yet been prepared.]**

Page 5-7: What is the evidence that Site D, which was partially excavated, stabilized and capped, is not leaking PCB's?

**[Response: PCB-contaminated soil was excavated from Site D in 1985. There was clear visual evidence of soil staining that correlated well with the presence/absence of PCBs. The soil contamination did not extend down to groundwater. The RI Report documents testing of groundwater for PCBs, which verified that there have been no impacts.]**

Page 5-34: Soil removal at primer tracer area 535 for radioactive contamination surpasses that of any other sites (50,000sq ft, yet it is not even mentioned.

**[Response: Presumably, the comment is referencing soil removal conducted by 3M as part of their NRC license decommissioning. As stated in previous responses, issues related to NRC licenses are not part of the CERCLA process and are therefore, not included in the Five-Year Review.]**

5-31 To state "No change in land use has occurred" is incorrect, as Army is transferring Rice Creek Corridor and the maintenance facility parcel right now. Therefore the "proposed land use is different from the assumptions used in remedy selection".

**[Response: The land transfers referenced have not occurred yet, and certainly were not within the time period covered by the Report. The Report discusses the pending transfers and notes that if land use changes, the cleanup levels and/or land use controls should be re-considered. Note that additional discussion will be added per MPCA and USEPA comments.]**

## Appendix C

### Photographs From Site Inspection





PGAC Water Treatment Facility (OU1)



Site C Remediation, in Progress (OU2)



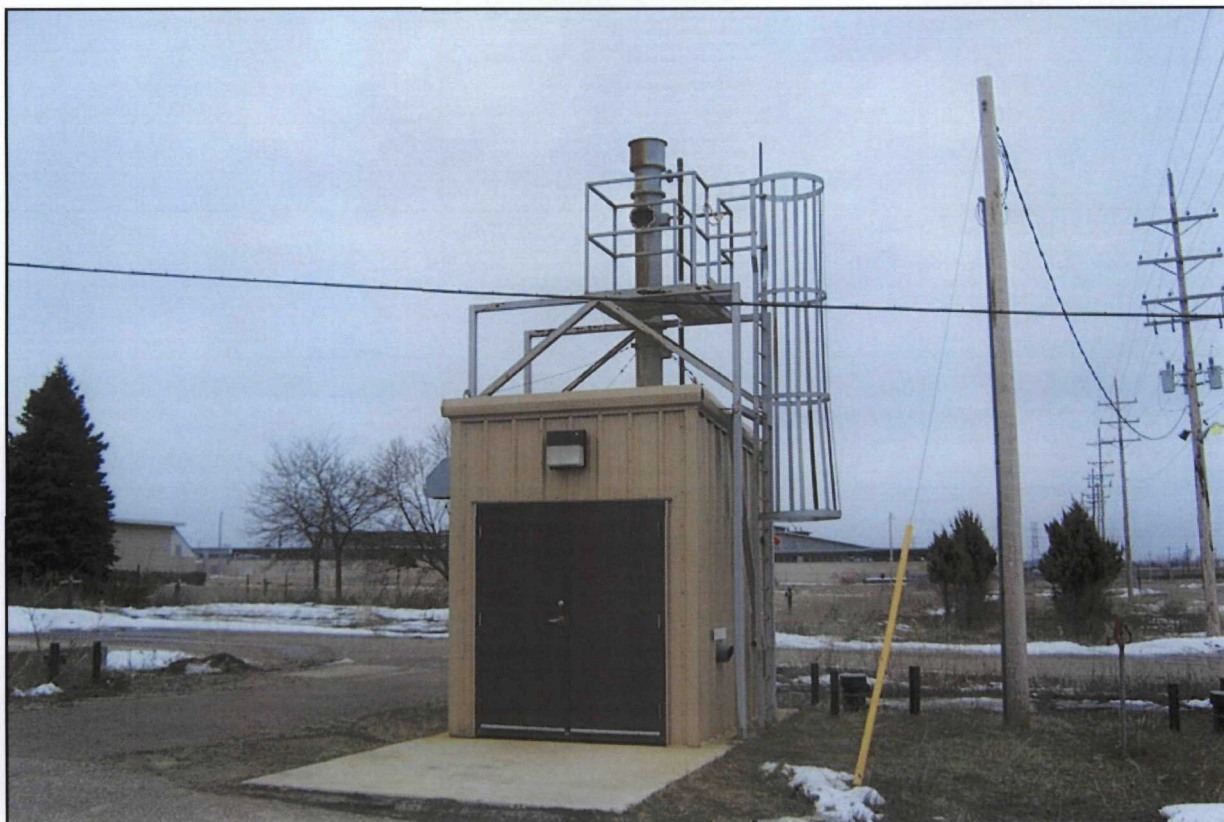


Site G Cover Improvement (OU2)



Caution Sign for Protective Soil Cover, Site E (OU2)





Site K Groundwater Treatment System (OU2)



TGRS Water Treatment Plant (OU2)

## **Appendix D**

### **Annual Site Inspection Checklist For Land Use Controls**

# ANNUAL SITE INSPECTION CHECKLIST FOR LAND USE CONTROLS

Twin Cities Army Ammunition Plant

Date: July 30, 2003

Inspected By: Dave Fuller (AMC/PCAPP), Dave Hamernick (National Guard)  
Keith Benker (Tecnusch/Wenck Installation Support Service)

Sites:	A	C	D	E	G	H	I	K
Site is located on property held by:	N.G.	AMC	N.G.	N.G.	N.G.	N.G.	AMC	AMC
Is the fence surrounding federally-controlled property intact?	Yes (1)	—						→
Is access to the federally-controlled property still controlled by the AMC, ATK, & the National Guard?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the current land use consistent with the land use scenario upon which the cleanup levels were based?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Has there been any excavation or other man-made soil disturbance at the site?	No	No (2)	No	No	No	No	Yes (5)	No
If excavation or soil disturbance has occurred, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A
If excavation or soil disturbance was authorized, was the work done in accordance with the approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A
Have any new structures or facilities (including new wells) been constructed on the site?	No	No	No	No	No	No	No	No
If new facilities or structures were constructed, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If new facilities or structures were authorized, was construction in accordance with the approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Has there been any damage to or removal/modification of groundwater remediation systems?	No	N/A	N/A	N/A	N/A	N/A	N/A	No
If such systems were removed or modified, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If system removal/modification was authorized, was removal/modification in accordance with approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If a protective soil cover is present, is adequate vegetation present throughout the soil cover area?	N/A	N/A	Yes	Yes	Yes	Yes	N/A	N/A
If a protective soil cover is present, is there any woody vegetation > 2" diameter present on the soil cover area?	N/A	N/A	N/A	N/A	Yes (4)	N/A	N/A	N/A
If a protective soil cover is present, are run-on/runoff controls in good condition (swales, berms, riprap, etc.)?	N/A	N/A	Yes	Yes	Yes	Yes	N/A	N/A
If a protective soil cover is present, are signs marking the edge of the soil cover present and in good condition?	N/A	N/A	No (3)	No (3)	No (3)	No (3)	N/A	N/A

Comments (Attach additional pages as necessary):

- (1) In accordance with the facility operating contract, Tecnusch/Wenck performed an annual inspection of the perimeter fence in April 2003, as documented in a letter to Mike Fix dated April 17, 2003. The inspection included the perimeter fence around the property controlled by the National Guard.
- (2) Site C remediation has not been completed, but there was no evidence of any disturbance since work was suspended.
- (3) Signs will be installed in the Fall 2003.
- (4) Woody vegetation will be removed during construction of cover improvements in the Fall 2003.
- (5) Soil disturbance and regrading was recently completed as part of demolition for a wing of Building 502.

# ANNUAL SITE INSPECTION CHECKLIST FOR LAND USE CONTROLS

Twin Cities Army Ammunition Plant

Date: July 30, 2003

Inspected By: Dave Fuller, Dave Humernick, Keith Benker

Sites:	129-3	129-5	129-15	Grenade Range	Outdoor Firing Range	Bldg 135 P/T Area	Bldg 535 P/T Area	Phyto Demo Area	Unchar. Land
Site is located on property held by:	N.G.	N.G.	N.G.	N.G.	N.G.	AMC	N.G.	AMC	AMC/N.G.
Is the fence surrounding federally-controlled property intact?	Yes (1)	—	—	—	—	—	—	—	—
Is access to the federally-controlled property still controlled by the AMC, ATK, & the National Guard?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the current land use consistent with the land use scenario upon which the cleanup levels were based?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Has there been any excavation or other man-made soil disturbance at the site?	No	No	No	No	No	Yes (7)	Yes (7)	No (2)	N/A
If excavation or soil disturbance has occurred, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	N/A
If excavation or soil disturbance was authorized, was the work done in accordance with the approved plan?	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	N/A
Have any new structures or facilities (including new wells) been constructed on the site?	No	No	No	No	No	No	Yes (8)	No	N/A
If new facilities or structures were constructed, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A
If new facilities or structures were authorized, was construction in accordance with the approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A
Has there been any damage to or removal/modification of groundwater remediation/monitoring systems?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	N/A
If such systems were removed or modified, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If system removal/modification was authorized, was removal/modification in accordance with approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If a protective soil cover is present, is adequate vegetation present throughout the soil cover area?	N/A	N/A	Yes	N/A	(6)	N/A	N/A	N/A	N/A
If a protective soil cover is present, is there any woody vegetation > 2" diameter present on the soil cover area?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If a protective soil cover is present, are run-on/runoff controls in good condition (swales, berms, riprap, etc.)?	N/A	N/A	Yes	N/A	(6)	N/A	N/A	N/A	N/A
If a protective soil cover is present, are signs marking the edge of the soil cover present and in good condition?	N/A	N/A	No (3)	N/A	No (3)	N/A	N/A	N/A	N/A

Comments: (Attach additional pages as necessary):

- (6) The soil cover for an area at the 1900 Yard Range is expected to be constructed in the Fall 2003.
- (7) Intrusive soil investigation work was performed during the past year.
- (8) Improvements were made to the parking lot adjacent to Building 535